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PAPERS FROM TORTUGAS LABORATORY, VOL. XXX

A Discussion of the
Sponge Fauna of the Dry Tortugas
in Particular and the West Indies in General, with Material for a Revision of the Families and Orders of the Porifera

BY

M. W. de LAUBENFELS

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Sponge Fauna of the Dry Tortugas

INTRODUCTION

The Dry Tortugas consists of a small group of islands of coral sand, the largest scarcely 1 square kilometer. They are located in north latitude 24 degrees and 38 minutes, and extend from west longitude 82 degrees and 52 minutes to 82 degrees and 56 minutes. The number of islands varies with the height of the tide, none being more than a few feet above high water, and some being exposed only at low tide; all around them are numerous shoals and considerable coral reefs. The Gulf Stream flows eastward just south of them, helping to make the region one of considerable faunal interest.

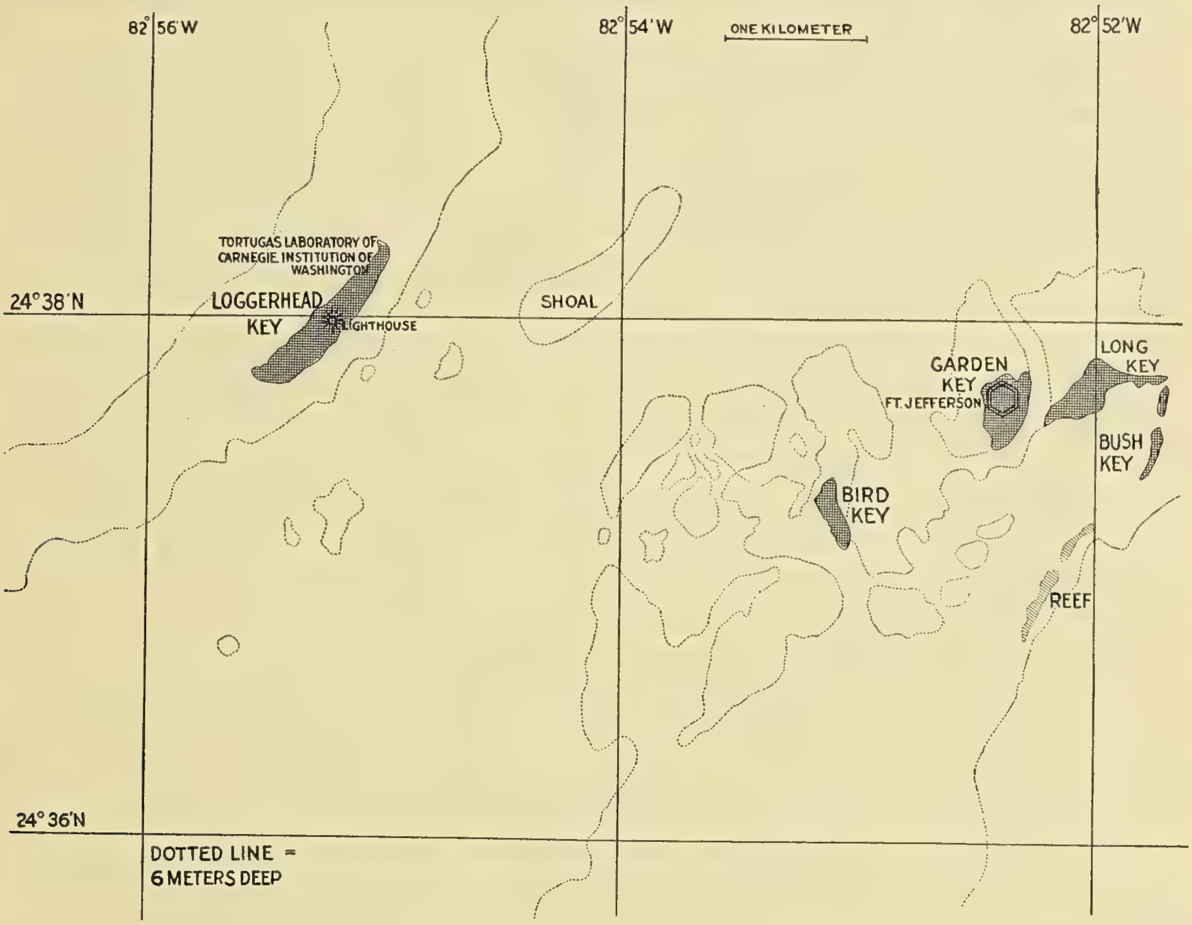


FIG. 1—Map of the Dry Tortugas. Notice half-way between Bird Key and the Reef the several deep basins, each entirely surrounded by shallow water.

From time to time sponge specimens seeming to be of especial interest were collected near the Dry Tortugas by scientists affiliated with the Carnegie Institution of Washington, or working at the laboratory maintained on

Loggerhead Key by that Institution. These were sent to the U. S. National Museum which lent them to me for study in 1932. In 1927 I did a little desultory collecting in the Dry Tortugas during July. In 1928, I collected off and on all summer, chiefly by wading in shallow water, using sponge hooks in the slightly deeper water, and employing the diving apparatus in still deeper water. A little dredging was also done from the yacht *Anton Dohrn.* In 1932, in addition to the individual collecting methods mentioned above, a great deal of dredging was carried on from the *Anton Dohrn,* very numerous sponges being collected from depths of 17 to 1047 meters.

The West Indian region in general is very rich in marine life, perhaps partly because numerous currents flow toward it. This has long been known as one of the richest collecting grounds for sponges in the world, and the above mentioned archipelago offers a representative sample of it.

In this treatise the term "West Indian" is understood as applying to the sea coasts of Florida, the maritime regions about the archipelagos known as the Greater and Lesser Antilles, the Bahamas, and also to the vicinity of the Bermuda Islands. This latter locality is some 2500 kilometers from the main portion of the West Indian Islands, but the Gulf Stream flows from said main portion toward Bermuda, and there are convincing reasons for believing that the fauna of each has much in common with the other. This entire region is contained in a circle having its center at Latitude 21 degrees north, Longitude 70 degrees and 30 minutes west, and possessing a radius of nearly 1900 kilometers. This takes in a small portion of the north coast of South America (Colombia and Venezuela) not much considered in this discussion, partly because its sponge-fauna is almost unknown; otherwise this circle extends from Barbados on the southeast, to Bermuda at the north, to the extreme west end of Cuba at the west. The islands of the Dry Tortugas are also near the extreme west of the circle.

Sponges are entirely under-water animals, although a few can survive exposure by low tides. Their toleration of environmental conditions is great, as indicated by de Laubenfels' 1932 report on the physiology of certain Dry Tortugas species. Another interesting bit of research here is that by M. C. Old (1932) with regard to fresh-water species.

As one walks about on the bottom of the sea near the Dry Tortugas, using a diving apparatus, at depths of less than 10 meters, so that the visibility is good, the surroundings are very beautiful. The coral sand is snowy white under foot, the underside of the surface film makes a silvery roof over head, the distances around are blue-green. Gaudy fish swim through the forests of purple and yellow bush-like cœlenterates (corals and gorgonians). Not the least striking nor least beautiful are the sponges in this habitat. Big dark *Spheciospongia vesparias* stand up as big as barrels, and shaped somewhat like them. Graceful vase-shaped *Hircinia campanas* abound. There are rich red bushes of *Haliclona rubens,* chrome-yellow bushes of *Verongia* *fulva*, two or three *Haliclonas* of different shades of green, and dark purple bushes of *Iotrochota birotulata.* There are small flaming orange sponges such as *Myriastra kallitetilla* and such azure blue ones as *Dysidea etheria.* The Calcispongiæ are white symmetrical vases like *Leuconia barbata.* The abundant *Hircinia strobilinas,* like the less common commercial sponges (*Spongia obliqua*), are velvety black. Comparisons to a "fairyland" are appropriate.

The sponges constitute the Phylum Porifera (Grant 1835, Todd's Cyclopædia vol. I, p. 107), so termed from their numerous inhalent apertures.

Those whose skeletons contain calcareous structures produced by their own cells, also lack spongin, have rather larger cells than the others (7μ to 30μ instead of 2μ to 17μ), and while a few have the complex leucon structure, all sponges of simpler morphology (sycons and ascons) belong here. They evidently constitute a separate class. The well-established prior name is Calcispongiæ. It is true that recent authors have frequently used Calcarea, following Sollas (1875, p. 421), but it should be noted that this same author later (1886, p. 112) returned to the use of Calcispongiæ. The exact authorship is uncertain; Schmidt (1862, p. 13) employed it clearly for the class as here defined and perhaps deserves the credit. Vosmaer, however, on page 203 of "Das Thierreich" (1885) credits Nardo with the name, but I did not find it in Nardo's writings; on page 369 of "Das Thierreich" (1886) Vosmaer credits Johnston, but Johnston (1842, p. 172) credited Blainville (1834, p. 530), and Vosmaer (1885, p. 50) also refers to the use of "Calcispongia" by Blainville in 1830. Johnston's and Blainville's term, although including all the sponges with calcareous spicules, treats of them as but a single genus. Whether or not Schmidt be cited as author, which I believe proper, his is the preferable name for this class.

Of the sponges lacking calcareous spicules it is customary to make two classes. One of these never has spongin; the other usually does. The former has very diaphanous structure, little or no jelly-like skeleton, and occurs only in rather deep water; the latter is usually densely built and often lives in intertidal regions. The former has principal spicules with rays extending five or six ways from a central point; the alternative class may have spicules superficially of this sort, but if so they are always relatively unimportant and small. The first of these is frequently termed Hexactinellidæ, following Schmidt (1870, p. 13), where, however, it is apparently intended as a family, both by its ending, which is that regularly assigned to families, and also by the fact that the author subdivided it immediately into genera. There is still a family properly termed Hexactinellidæ, because its type genus is *Hexactinella.* This family is a restricted group within the class under discussion. It can scarcely be said to be advisable, however, to employ the name of a family within a class also for the entire class. Furthermore, the term Hexactinellidæ does not have priority for the class, because, as Schulze (1887, p. 7) shows, the first name clearly so employed was Vitrea, proposed by Wyville Thomson

(1868, *circa* p. 120). No one has since regarded this name as appropriate, and as the law of priority is not strictly applicable to names of classes, I propose to employ, instead of Vitrea, the name Hyalospongiæ Vosmaer (1886, p. 252). This has the very great advantage of harmony with the names required for the other two classes, namely, Calcispongiæ and Demospongiæ.

The Demospongiæ (name proposed by Sollas, 1875, p. 421) constitute a large class which contains the majority of the families and genera of sponges. There is a slight possibility that the families here assigned are polyphyletic; the Oscarellidæ particularly being difficult to allocate, as will be discussed below. The sponges of this family lack any hard skeleton whatsoever, and may be ancestral, but if degenerate instead (as is likely), it is not known from what order or class of spiculiferous sponge they have descended.

Appeal to the study of nature leaves the student of Porifera in this quandary, that almost all types of sponge are connected with each other by numerous intermediates. As the years go by, still more such connecting links are found. No matter how we define orders, we are haunted by families that might go in either of two of them. The three classes of Porifera are sharply separated, but within each it is conceivable to argue that there exists only one order. The same overlapping is found affecting families, and by emphasizing the dubious cases and conspicuous intermediates we might soon have only one family per order. The genera also similarly blend. Spicule sizes vary in the individual, spicule sorts are lost, dermal structures change with maturity and senescence, environmental effects are immeasurably great. This, that, and the other criterion for separating genera proves to be unreliable—in fact, not a single basis is quite safe. Carrying out this indisputably true argument, we would ultimately find only one genus per family. Need I add that the end of such reasoning is also only one species per genus? There would then be left three sponge species: *Spongia officinalis* Linné 1758, *Hyalonema sieboldi* Gray 1832 and *Scypha* (*Spongia*) *ciliata* Fabricius 1780.

A description of the first of these species, for example, might include such items as having more or less spongin (much in the type specimen) and having nearly all sorts of spicules, but many of these often accidentally missing from specimens, in some cases all sorts being wanting.

One may term this extreme synonymization ridiculous, but as evidence accumulates to prove that losses do occur to sponges, whole spicule sorts vanishing, it can not be disposed of as merely a silly notion. If it is to be discarded, the basis must be frankly that we humans are grouping specimens into a classification for our human uses. We use natural traits as a basis, and approximate phylogenetic considerations, as well as we possibly can, but these are always inevitably imperfect, hence when in doubt we are justified in appealing to convenience.

I hereby propose, because of the confusion resulting from undue synonymization, that whenever a reasonable doubt exists as to the identity of two sorts, that separate names be retained for them. We should state plainly when such forms are closely related, and though we may consider them to be congeneric or conspecific, for convenience they should have separate designations until proof of identity is clearly demonstrated.

When dealing with sponge genera it would be convenient to be able to classify them as to families, but many have not been placed in any family, thus giving rise to a noteworthy problem. In some cases this is merely because the author of the genus did not choose to cite the family, but more often it is because the genus can be allocated as to family only with great difficulty. This trouble has been brought about partly by lack of preparation of usable families in the classification and partly because, no matter how families be diagnosed, some sponges prove to be intermediate in structure. To indicate the extent of the need for more systematization, one may notice the classification of Hentschel 1923, which is the most thorough of any proposed during the last third of a century. So many genera have been established in this period of time that earlier systems, for instance those of Minchin 1900, and Vosmaer 1885, are quite insufficient. Hentschel in classifying the Demospongiæ treats of 340 genera, but there are now some 908 genera of that class to be considered; of these 195 should be properly transferred to synonymy, and 111 have been published since 1923, but this leaves 602 genera in good standing at the time the 340 were classified.

A serious attempt to systematize all sponge genera is here undertaken. In the dubious cases, it is felt that a surmise may temporarily be justified upon the ground of convenience. It is unsystematic to make excessive use of the term "incertæ sedis," though literally true that designation may all too often be. Those names have been omitted which were so inadequately described that they are not only mysteries as to family relationship but even as to their order or class. Many of these probably represent specimens not even sponges. When the generic evidence points toward two or more families, I have made the best conjecture that I could and can only crave indulgence from those who may some day discover better evidence. Needless to say some further emendation will later prove necessary.

It has appeared advisable to erect several new families and in many cases to propose new names for families already in use, because of Article 4 of the International Rules for Zoological Nomenclature. Some sponge family names had been synthesized without reference to any existing genus whatsoever, and others named for recent genera transferred into the company of older ones. The bounds set upon families in this treatise are so frequently more or less different from earlier delineations that the term "emended" should be understood as appropriate throughout; it is omitted merely to avoid monotony.

In dealing with classification of Porifera it is especially important to base present diagnoses upon redescriptions of type specimens rather than original diagnoses. Many early authors, such as Lamarck for instance, had inadequate microscopic equipment. Their diagnoses, based on external characters almost entirely, would include forms now unanimously agreed to be diverse. In some cases, as for example the genus *Hymeraphia*, the vast majority of species ascribed have fitted the wording of the diagnosis but are not congeneric with the genotype. Since the type can not be removed from the genus which was erected especially for it, the diagnosis must be rewritten and many species reallocated. Numerous somewhat similar but less extreme cases have proven to need revision in connection with systematization of the West Indian Porifera.

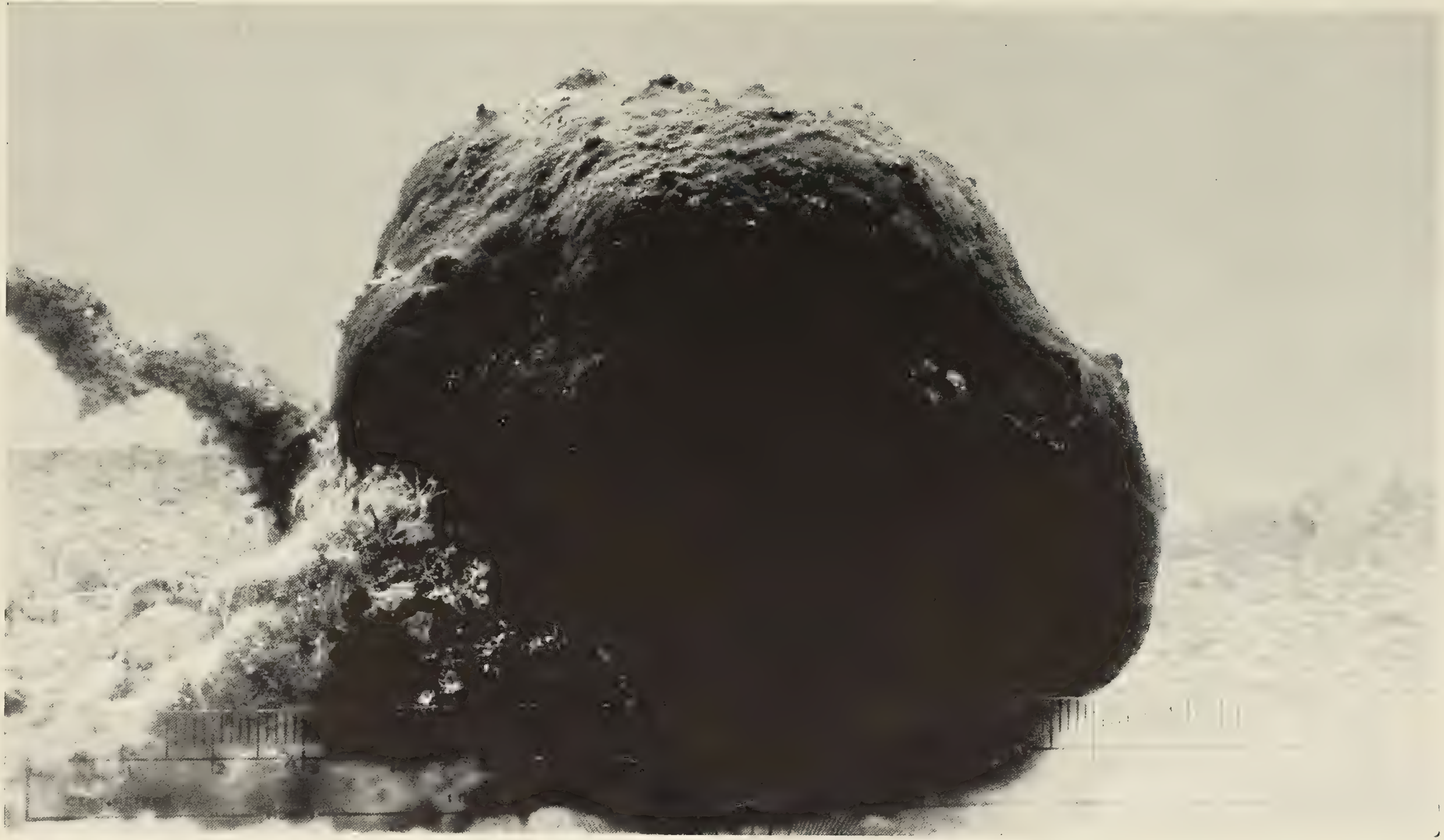
Representatives of each of the species discussed in this paper have been deposited in the United States National Museum. U. S. National Museum catalogue numbers have been given in the text for the holotype of each new species described.

DEMOSPONGIÆ Sollas

The sponges of the class Demospongiæ manifest a tremendous variety of shapes, in contrast to the other two classes, which are more frequently symmetrical. They exhibit the greatest size range of any of the three classes, and the same may be said of their variegated colors. Their consistency may be of almost any nature, whereas the other classes are never conspicuously elastic. Their histological structure is more uniform, however, than is that of the Calcispongiæ as mentioned above; and they always have relatively small flagellate chambers. It is here proposed to divide the class into the following orders: Keratosa, Haplosclerina, Pœcilosclerina, Halichondrina, Hadromerina, Epipolasida, Choristida and Carnosa. This is very much like the classification suggested by Topsent in 1928, but is modified in several items which will be discussed as they are reached in the orderly discussion of the families.

KERATOSA Bowerbank

The first order, the Keratosa, corresponds rather closely to Topsent's two orders, the Dictyoceratina and the Dendroceratina, with the addition of some genera from his order Myxospongida. The principal points upon which the two orders of Topsent's were separated were that, in the one, the fibers regularly anastomosed and, in the other, they did not. This does not seem to the writer a sufficient reason for making two orders, although of course the two groups need separation. As here defined, the order comprises those sponges which have no proper spicules at all, and usually are well provided with horny skeletons of the substances collectively known as spongin. To these I add a few genera with no skeleton at all except a jelly-like mass, but which indicate in many ways, as for instance in their histology and gross external appearance, that they are closely related to genera which are undoubtedly Keratosa. The species of this order show the utmost variation in shape and size and color, but are almost invariably elastic in consistency. A decided possibility exists that the order is polyphyletic in origin, that is to say, that many of its species represent different sorts of ancestral spiculiferous sponges which have independently lost the hard skeletal structures. While this deserves mention, since it is purely hypothetical, it may be temporarily ignored for purposes of convenience in classifying the group. It is here proposed to divide the order into the families Spongiidæ, Dysidiidæ, Darwinellidæ, Halisarcidæ and Psamminidæ.



Spongia obliqua. This is a commercial sponge of the sort known as reef sponge. Photograph of specimen still under water, scarcely disturbed at all, and illustrating appearance of healthy living commercial sponge. Celluloid ruler placed against specimen and photographed with it shows amount of enlargement. The bottom is chiefly dead coral (*Porites*).

SPONGIIDÆ Gray

The family Spongiidæ contains the type genus and species of the entire phylum of Porifera, and therefore it seems appropriate to consider it first. Its genera always have reticulate skeletons, of very elastic spongin. The flagellate chambers are always small and diplodal—never eurypyllous. It resembles the family Dysideidæ except that this family has eurypyllous flagellate chambers, and the Darwinellidæ except that here there are not only eurypyllous flagellate chambers, but also fibers that seldom anastomose so that they do not make a reticulum. Among the families provided with proper spicules, fibers very similar to those of the Spongiidæ are found in members of the family Agelasiidæ and in some of the members of the families Haliclonidæ and Adociidæ. In the case of the latter two, however, the architecture at the immediate surface is so different from that of the Spongiidæ that it seems probable, were any of them to lose their spicules, they could still be separated without confusion. In fact, just this seems to have happened, for we do have species of those two families which lack spicules, or for which we must at least say that we have *not yet found* their spicules.

SPONGIA Linné

This is not only the type genus of the family Spongiidæ, but of the entire phylum, and so commands more attention than any other genus. It may be differentiated from the rest of the family because of its possession of principal fibers which are cored with foreign mineral bodies and an enormous number of secondary narrow fibers which are not so cored, but are more homogeneous and reticulate. *Spongia* also lacks the reticulation of relatively enormous subdermal canals which characterizes the genus *Hippiospongia.* One of the most interesting things about this genus is the fact that many of its species are of commercial value. In fact all of its species have at least some worth in terms of dollars and cents. In this connection a special reference may be made to the Bureau of Fisheries Document No. 667, *The Commercial Sponges and the Sponge Fisheries,* H. F. Moore. The appended plates in this publication are valuable as indicating the different types of commercial sponges of the West Indian Region.

Two of the principal commercial sponges of the Mediterranean (which has been studied longer than the West Indies) are *Spongia officinalis* Linné and *Spongia zimocca* Schmidt. Corresponding to these, in the West Indies we have the four commercial varieties known respectively as the "Reef," the "Hardhead," the "Yellow," and the "Grass" sponges. All four of these are regarded by many authors as belonging to *Spongia officinalis*, and there is some reason to believe that this may possibly be the case, but it is by no means certain, and to make such an assumption leaves us without any means in the scientific designation for discriminating between the obviously very different commercial varieties. We are here confronted with a philosophical question, as to what is, and what is not, a species. It seems to the writer that the matter of convenience to human beings is of primary importance, and at the risk of seeming inconsistent, I propose to follow that course which seems convenient; always, of course, presupposing that there are definite recognizable differences. The only doubt should be as to whether or not these differences are great enough to constitute specific as compared to subspecific rank. To give a definite example, I propose that we refer to the West Indian Yellow sponge as *Spongia barbara,* though others might well argue that it should be called *Spongia officinalis* subspecies *barbara.* The two American varieties most like the old world *officinalis,* are the Reef sponge, *Spongia obliqua* Duchassaing and Michelotti (1864, p. 38), and the Hardhead, *Spongia dura* Hyatt (1877, p. 522). The two American varieties most like the old world *zimocca* are the Yellow sponge, *Spongia barbara* Duchassaing and Michelotti (1864, p. 31), and the Grass sponge, *Spongia graminea* Hyatt 1877 (p. 516).

Linné, in establishing the genus *Spongia*, included therein practically all the sponges of which he knew, and very much the same is true of many other early authors, such as Pallas, for example; they left no preserved specimens, and except in the case of the old world commercial sponges, most of their species are unrecognizably described. This latter applies also to such authors as Esper and Lamarck, but since they left some museum specimens which have since been described by Ehlers and Topsent, we can identify some of their names with modern well-known species. Of course many of the species which were in former times referred to the all-encompassing genus *Spongia* have been withdrawn to other genera. In consideration of this, Bronn 1859, proposed that the entire genus have its name changed, but this is in complete violation of the International Rules of Zoological Nomenclature, and it is much to be regretted that very numerous authors on the subject of sponges refer to the genus *Spongia* by Bronn's name of *Euspongia*. All the authors prior to 1864 who described West Indian species as of the genus *Spongia*, with the exception of *Spongia officinalis*, seem to have dealt with forms now properly relegated to other genera.

In 1864, Duchassaing and Michelotti described numerous West Indian sponges, of which the majority are not only unrecognizably described, but are not represented by any preserved specimens, so that they are forever lost. Some specimens described by these authors are preserved in the Museum of the University of Turin, where in 1928 I had the privilege of studying them, with due gratitude to the Director of the University and to Professor Alfredo Corti of the Zoological Department. There are specimens, but in such condition that they are very difficult to recognize, of Duchassaing and Michelotti's *cerebriformis* (p. 32), *complanata* (p. 37), *fenestrata* (p. 36), *lapidescens* (p. 34) and *meandriformis* (p. 33). Duchassaing and Michelotti's *Spongia barbara* (p. 31) seems very clearly to be the common West Indian Yellow sponge, and their *obliqua* (p. 38) seems clearly to be the Reef sponge.

Hyatt (in 1877, p. 511) gave a very complete discussion of the genus *Spongia*. Reference to the species he assigns might well be appropriate here. His *discus* is not that of Duchassaing and Michelotti, and is unrecognizable; the differences which his specimen manifested as compared to other species are probably due to some peculiar method of drying or preparing that it had undergone. His *lignea* is beach-worn and unrecognizable. His *graminea* (p. 516) is the Grass sponge. His *equina*, which he attributes to Schmidt, is not certainly that of the latter author. He divided it into subspecies, of which the first is *gossypina*. He attributes this to Duchassaing and Michelotti, and theirs was a Velvet, but his appears not to be, as is true of the Velvet, a *Hippiospongia*. His second subspecies, *meandriformis*, appears to be a Velvet sponge; Duchassaing and Michelotti first used the name, but theirs is not easily identified. The third subspecies is *cerebriformis*, the name first used by Duchassaing and Michelotti for a specimen very difficult to identify; Hyatt's appears from his description to have been a Grass sponge. His species *agaricina*, which he attributes to Pallas as author, is puzzling. The specimen of Pallas is unavailable and the description unrecognizable; Hyatt's specimens seem to have been some of them yellow sponges, some of them hardheads, and others unidentifiable. His next species is *vermiculata*, a name used by Duchassaing and Michelotti for a lost and unrecognizable specimen; Hyatt's may have been a wire sponge. His last species, *lapidescens*, is also unrecognizable from his description and figures. It would appear that all subsequent authors, treating of members of this genus from the West Indies, have described only species named by earlier authors, particularly the above mentioned.

Spongia obliqua Duchassaing and Michelotti

Plate 1, fig. 1; Plate 2, fig. 1.

This species is moderately common in the Dry Tortugas region only in the vicinity of Bush Key reef, where it occurs exclusively on the sheltered side away from the force of the waves and usually at depths of less than one meter. In these places there is so little current that on sunshiny days the stagnant water attains a temperature of 39° C., according to measurements I have made, and perhaps even higher on exceptional occasions.

The shape is typically hemispherical with the flat side up. The rather numerous oscules are on the flat side as a rule; malformations of this plan are more numerous than the symmetrical examples, but almost all specimens show at least a tendency to this shape. The size varies up to at least 20 cm. in height and thickness. The ectosomal color is black or nearly so. The endosome varies from dull ochre to brownish orange. The smooth fleshy linings of the canals are colored gray. The consistency is very spongy, but it is much easier to cut this species with a knife than other keratose sponges, such as for example species of the genus *Hircinia.* The surface is nearly smooth in life, but upon removal from water low conules then appear, about 1 mm. high and 1 to 5 mm. apart. The oscules are 3 to 11 mm. in diameter, and in life the pores are from 40μ to 80μ, so abundant that the strands separating them are less in diameter than the apertures. The dermis, apparently made of spongin, is 30μ to 75μ thick and contains considerable quantities of very fine grains of foreign material. It is rather easily separated from the mass of the sponge, especially by maceration. The endosome is very full of organic material, with relatively small canals. The abundant flagellate chambers are from 25μ to 30μ in diameter. Few other species of sponge show them so closely crowded together as is true in this instance. The fibers make a dense reticulation throughout the entire sponge, with subrectangular measures that are about 150μ to 300μ in diameter. The vast majority of these fibers are of the sort called secondary. They are of clear yellow spongin. They may or may not have a pronounced granulation of the surface. If this is present at all in a given specimen it seems to extend throughout the entire specimen. Its significance seems for the present to remain obscure; I find no correlation with age or ecological situation. The above-mentioned secondary fibers are from 30μ to 50μ in diameter, usually 35μ. Among them at intervals of 1 mm. or more apart, there are fibers perpendicular to the surface; when they attain the surface they cause conules there. These fibers differ from the common ones in that they have a core of foreign material, for example fine grains of sand and broken bits of spicules from other sponges. The diameter of these, which are sometimes called principal fibers, is a little more than that of the others, about 65μ.

This is evidently what is known commercially as a Cuban Reef sponge; there is some resemblance to the yellows, particularly the Florida yellows, but the resemblance of the dried specimen is definite. I would point out the comparatively uniform or level surface, with the relatively large number of openings leading from it in the case of the dried specimen, each about 1 mm. in diameter. The figure in Moore, *The Commercial Sponges*, plate LV, is interesting. The amount of foreign material in the dermis of this species is suggestive of the group sometimes referred to as the genus *Coscino-*

derma, but I doubt that this should be considered to be congeneric with *Spongia*. The comparatively poor quality and lack of abundance of these sponges at Tortugas renders the area of negligible commercial value from the standpoint of sponge fishermen; see further notes below in connection with the remarks on *Hippiospongia*. In 1932 I made numerous efforts to carry on physiological experiments with this species with indifferent results, I found that the specimens died much more readily than was true of numerous other species with which I experimented.

COSCINODERMA Carter

This genus is very like *Spongia*, but differs in having much more extensive inclusion of foreign material in the dermis and in lacking sharply differentiated primary fibers among the more common so-called secondary ones. I hereby propose the name *Coscinoderma lamarcki* nomen novem for the species originally described as *Spongia sinuosa* Lamarck 1814 (p. 371), which is not the same as *Spongia sinuosa* Pallas 1766 (p. 394).

Coscinoderma lanuga new species

Plate 6, fig. 5.

The only specimen, the holotype, U. S. Nat. Mus. Cat. No. 22402, was dredged on June 17, 1932, southeast of Loggerhead Key at a depth of 80 meters. This is an irregularly lobate mass about 12 cm. in greatest diameter; there are dome-shaped protrusions, well rounded, 1 to 3 cm. in diameter, and some are as much as 3.5 cm. high. They often have terminal oscules. The color in life and in alcohol is pale gray. The consistency is stiffly elastic, easily cut, as is true also of the genus *Spongia*. The surface is just barely lumpy to the naked eye, but is irregularly hispidated with protruding fibers that are evidently foreign. There are faint traces of conules, scarcely protruding at all, about 1 mm. apart. There is a tough cortex, paler and denser than the endosome, 600μ to 1200μ thick. It is densely packed with sand grains and broken spicules; the fragments are all in the neighborhood of 20μ in diameter, not much more. There are extensive subdermal spaces underneath this cortex, so that it may be detached very readily. The specimen shows about a dozen conspicuous oscules 2 to 5 mm. in diameter, but the pores are not visible to the naked eye. The endosome is remarkably dense in places, there being few canals or chambers larger than 1 mm. in diameter. Throughout the flesh occur scattered foreign fragments similar to those in the cortex, but it is noteworthy that these are seldom included in the fibers. The flagellate chambers are spherical, scarcely 25μ in diameter. There are optically visible fibers ramifying about, irregularly branching and anastomosing, making a network rather less symmetrical than in typical *Spongias*. These fibers are often about 700μ apart; they consist of practically homogeneous spongin and are usually 30μ to 45μ in diameter. They are often as close as 160μ to each other. A few near the surface do contain some foreign material, but there is little or no differentiation into primary and secondary fibers.

It is to be regretted that only one specimen was available, as it would be interesting to macerate and dry specimens of this sort in order to compare them with the ordinary commercial species. It is quite conceivable, for instance, that sorts like the preceding might be regarded as being the Cuban Reef sponge. Certainly its external shape is one relatively common in that commercial variety. In justification of the suggestion that it is a new species, note the lack of primary fibers and the large amount of dermal detritus. It is difficult to compare this to other species of so-called *Coscino-*

derma, because many of them are inadequately described. From the West Indies we have the sponge that Hyatt (1877, p. 535) described as *Spongelia sinosa,* which Lendenfeld (1889, p. 334) referred to *Coscinoderma.* Its description is inadequate for comparison here; it may or may not be conspecific or even congeneric. *Coscinoderma lamarcki* referred to above, is sharply separated from the one under discussion by having special perforated nodes in its skeleton. Most of the other Coscinodermas are from the Australian region and in general have much coarser fibers than *lanuga.*

HIPPIOSPONGIA new genus

Throughout the West Indian region it is customary among the dealers in commercial sponges to divide them decisively into two groups, one of which, mentioned above, comprises the yellow and reef sponges, and appears to correspond to the genus *Spongia* proper. The other group has frequently been assumed to correspond to the genus *Hippospongia* Schulze 1879, the genotype of which we may assume to be that designated by the name of *Spongia equina* Schmidt. It would appear that Schmidt left no specimen of his *equina* and his description is not overly good. Burton in 1934 (p. 575) sets apart a specimen to serve as type of the species *equina* which is conspecific with *Spongia officinalis.* For this reason the genus *Hippospongia* must fall into synonymy with the genus *Spongia* Linné 1759 (p. 1348); since this leaves us with no generic name by which to designate the commercial sheepswool sponges, I propose for these latter the new generic name *Hippiospongia,* the genotype of the new genus to be *H. lachne* new species, described below. The genus as here circumscribed is separated from *Spongia* proper in having no, or practically no, primary fibers set apart in any way whatsoever from the common fibers which in *Spongia* are regarded as being secondary. In *Hippiospongia* there is practically never even a trace of foreign inclusion within the fiber. The consistency is recognizably different from that of the genus *Spongia.* The laborers who sort out dried commercial sponges for dealers are able to discriminate between them accurately and immediately upon touch. The appearance is also noted, but this must be secondary, as the work often goes on in very dim light, as I have personally observed. It is very difficult to describe this difference in print, but in general West Indian members of *Hippiospongia* are notably softer than any except the softest members of the genus *Spongia,* and even then there is a delicate qualitative difference. The surface structure is also distinctive, there are typically enormous subdermal canals almost circular in cross-section and about 5 to 10 mm. in diameter, which make a reticulation immediately below the dermis. So much of the surface is given over to this reticulation that in dried specimens, which lack the surface skin, the islands between the canals stand out as tubercules about 5 to 10 mm. in diameter and of the same height, or even in some cases as much as 15 or 20 mm. high. In the old world those sponges which appear to be congeneric with *Hippiospongia* as here described are regarded as being inferior in commercial quality and are spoken of as "horse" sponges, but in the West Indies they are the most valuable commercially of all and are called (as mentioned above) sheepswool and velvet. Judging from a redescription given by Topsent (1930, p. 10) of *Spongia communis* Lamarck (1814, p. 317), that represents the European species corresponding most nearly to the West Indian sheepswool.

The sheepswool sponges of the West Indies in museums are often labelled *Hippospongia canaliculata,* but *canaliculata* is of Lendenfeld (1885, p. 502) where it is a presumptuous new name for (and synonym of) Carter's *anfractuosa.* This is an Australian sponge not plausibly conspecific with any from the West Indies. It appears that a distinctive name is still lacking, so I propose the specific designation *lachne*, to be represented by (holotype) U. S. Nat. Mus. Cat. No. 801. This, as mentioned above, becomes genotype of the new genus *Hippiospongia*. From the other common West Indian member of this genus, *gossypina* (discussed below), *lachne* differs in that the summits of the islands left isolated by the enormous subdermal canals are tufted and feathery instead of dome-like. This distinction is very conspicuous in dried sponges, not so evident when the flesh is present. Presumably *lachne* is consistently more conulose than *gossypina*.

The commercial grade known as velvet is very close to the sheepswool. The earliest name that I find applied to it is *gossypina* Duchassaing and Michelotti (1864, p. 32). It is also quite possible that the commercial variety known as the glove sponge belongs to the genus *Hippiospongia*, but I have insufficient data in the way of specimens of this variety. Another commercial variety, which I find difficult to associate with any name in the literature, is the wire sponge. I suspect that this might belong properly to the genus *Coscinoderma*, species undetermined, but this is a mere surmise.

Hippiospongia gossypina (Duchassaing and Michelotti) new combination

This species was collected from the moat of Fort Jefferson early in June 1932 by Dr. R. G. Stone and preserved dry.

The general outline of the specimen collected by Dr. Stone is hemispherical, 3 cm. thick, 6 cm. in diameter. The color in life seems to have been black as to ectosome, over a brown endosome. The consistency is very spongy, even when dry. The dermis upon drying has pulled down into the tremendous dermal cavity for which this genus is remarkable, leaving isolated hillocks. These protuberances now are from 3 mm. in diameter at their distal ends to slightly less than that at the stalks or proximal ends, are 5 mm. high and 4 to 8 mm. apart from center to center. The subdermal cavity, which is conspicuous, is 2 to 6 mm., usually 4 mm. wide, and its depth is indicated by the height of the protuberances mentioned above. The fragments of dried dermis fail to reveal inhalent and exhalent apertures; this dermis is about 40μ thick, or rather less than that, in life. The fibers are all of the sort frequently termed secondary, none having any detritus, or being set apart as ascending to conules, as in the genus *Spongia*. The common size is 25μ to 40μ in diameter. They are rather zig-zag and enclose meshes of very irregular outline but which often are rectangles 150μ by 300μ or thereabouts, comparatively regular in plan, but with all of the outlines crooked.

Strangely enough this appears to be a typical example of the Bahama velvet sponge (see Moore, 1910, plate XLVI); one would expect it to be of the Cuban variety inasmuch as the nearest large amount of land to Tortugas is Cuba; it is scarcely more than 150 km. away, and the distance to the Bahamas is approximately three times that. It is, to be sure, more like the Florida velvet than it is like the Cuban velvet, but much more like the Bahaman variety than either. Inasmuch as the surface currents, at least, set from Tortugas and from Cuba toward Florida and thence to Bahama, one may speculate as to the possibility that the distribution of the sponge has been distinctly upstream rather than with the current. On the other hand, there is a possibility that the differences between the commercial varieties are due to ecological conditions. What these are, however, in spite of many years of very careful study, remains considerable of a mystery, except that there is evidence that sponges grow more slowly and of a finer texture in colder waters than in warmer waters, and that they are undoubtedly injured by much sediment in the water, and by certain poisons. The extent of our ignorance is demonstrated by the fact that

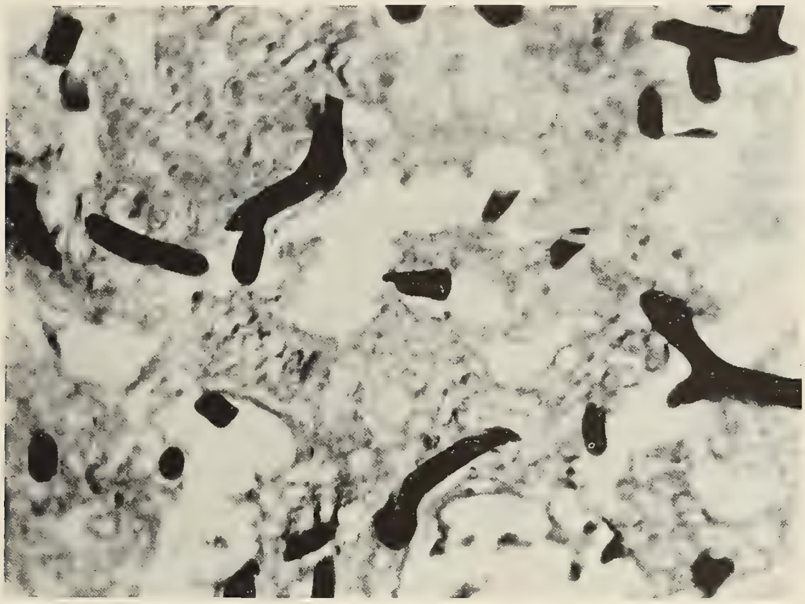


Fig. 1

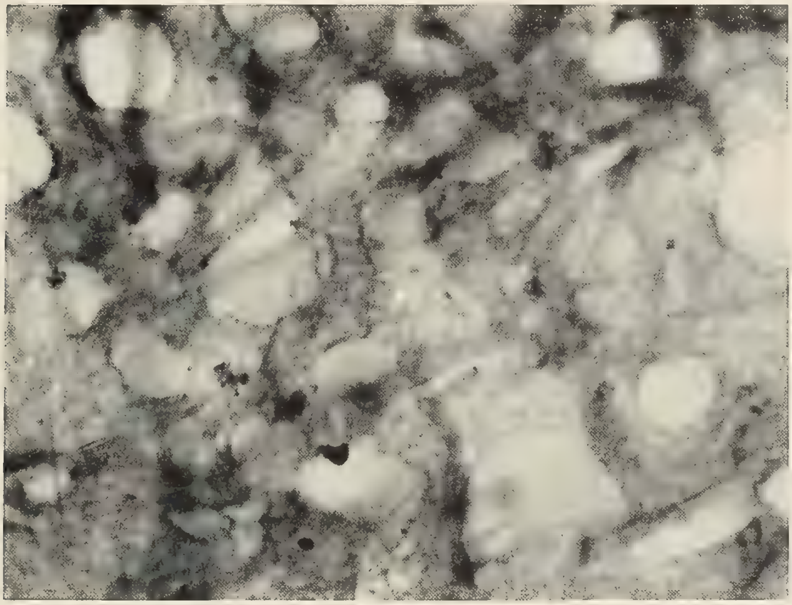


Fig. 2

Photomicrographs of sections x80. Figure 1, *Spongia obliqua*; Figure 2, *Trypespongia columbia*. The two types of histology warrant comparison. The *Spongia* is cut only about 12µ thick, the *Trypespongia* over 150µ, therefore note very diaphanous structure of latter; its flagellate chambers show as perforations in thin sheets of tissue. In contrast the more typical *Spongia* exhibits chambers massed in three-dimensional aggregations, which must be sliced thin if said chambers are to show. Both sections were taken deep within sponge and are typical of the endosomes of the two genera.

there seems to be no way of predicting what the commercial variety will be from a knowledge exclusively of the environmental factors.

As referred to above in connection with *Spongia obliqua*, the immediate vicinity of the Dry Tortugas is not now worthy of serious attention from professional "fishers" of commercial sponges, nor is it likely soon so to be. The waters about this archipelago have mostly sand-bottom, whereas the commercial sponges attain profitable size and abundance usually where there is much exposure of hard, stable bottom surfaces. In other respects the needs of commercial sponges, such as for currents (see Rathbun, 1887, p. 832), are well met at Tortugas.

TRYPESPONGIA new genus

This new genus is here proposed, with genotype *T. columbia* new species, for sponges differing from typical *Spongia* in the histological structure. Most or all of the flagellate chambers, instead of being arranged in relatively solid masses of tissue with inhalent and exhalent canals leading to and from them, are arranged in sheets having little more than two dimensions. In these sheets the chambers appear as mere perforations or holes. The structure is not to be interpreted as eurypyllous, however, but merely as diplodal with infinitesimally short apopyles and prosopyles. It may be well that specimens conspecific with the one under discussion at present occurred in the collections of earlier authors such as Schmidt, Duchassaing and Michelotti, and Hyatt, but because they described from dried specimens rather than from alcoholic ones, and because their descriptions are inadequate with respect to histological detail, we can not tell which (if any) earlier name was applied to this species.

Trypespongia columbia new species

Plate 2, fig. 2; Plate 5, fig. 3.

One specimen, the holotype, U. S. Nat. Mus. Cat. No. 22421, was dredged June 25, 1932, at a depth of 15 meters, in the region west of the White Shoals. Another, here designated the second, was dredged June 26, 1932, southeast of Loggerhead Key. Unless otherwise designated the description given below applies to both of these.

The shape is a rounded mass some 3 by 10 cm. with irregular low lumps on the surface. The color in life was reddish brown above, but dull drab within. The second specimen was paler than the first and more yellowish. The consistency is very spongy. The surface is conulose with conules scarcely 1 mm. high and from 1 to 1.5 mm. apart. There are, however, wandering strips from which the conules are absent. These are the locations of subdermal canals roofed by dermis only, and having this roof pierced at irregular intervals by what I take to be oscules. These are about 2 mm. in diameter. A very few of them are as large as 5 mm. In the second specimen are about half a dozen oscules that are raised on tubular elevations, with walls that become thinner toward the top, where they are less than 500μ thick. These processes vary from 1 to 2 cm. high. The dermis is noncellular, well supplied with bits of spicules from other sponges and with small grains of sand about 70μ in diameter. The histological condition of the specimen is quite remarkable; the spaces between the fibers are filled with numerous sheets of tissue instead of commonplace three dimensional masses. These sheets are about 30μ thick and are abundantly perforated with holes, 28 to 32μ in diameter, each hole surrounded by what certainly appear to be choanocytes. As mentioned above, my interpretation of these is as peculiar diplodal chambers, although their description technically sounds more like that applied to eurypyllous flagellate chambers. It will be noted that this architecture practically eliminates definite canals, substituting irregular openings of a cavernous nature. The fibers are very like those of *Hippiospongia*, and are usually 20 to 40μ in diameter, of clear homogeneous yellow spongin, making a rather irregular reticulation of meshes 100 to 400μ in diameter; 250μ is a very common measurement of them. There are also, near the surface at least, a very few fibers that do have some foreign matter, chiefly broken spicules. These are about 40 to 180μ in diameter, ascend toward the dermis, and are very dubiously to be regarded as principal fibers.

It is very much to be regretted that it was not possible to macerate and dry some specimens of this sponge for comparison with the commercial varieties. A guess is hazarded that in that case it might have been regarded as a "sheepswool" of very poor quality. It is further interesting to notice that other specimens of this same species have since been collected by myself from the Panama Canal Zone. Although at a distance of approximately 1600 km. these are indistinguishable from the Tortugas sponges here described. The arrangement of the flagellate chambers in sheets is very peculiar, no other described sponges being just exactly like this. One might expect that sponges of the type represented by *Trypespongia* would be relatively rare, that is to say less successful than others, because the indications are that this type would have much lower hydraulic efficiency than the common arrangement of sponge chambers.

POLYFIBROSPONGIA Bowerbank

This genus *Polyfibrospongia* is separated from the genus *Spongia* by the fact that instead of having simple and rather inconspicuous main or ascending fibers, there are conspicuous groups of ascending fibers making fascicular or trellis-like arrangements. It has been customary to refer sponges of this general description to a group called *Stelospongia* Schultze, but this is merely an unnecessary new name for the group previously called *Stelospongos* by Schmidt. Schmidt's original description, however, is not only unrecognizable, it is even devoid of all species whatsoever, and the group is known only on the basis of those species which later authors have chosen to refer to it. The first generic name associated with a description which can be recognized as applying to species of this type is *Polyfibrospongia*, of Bowerbank, genotype *Polyfibrospongia flabellifera* Bowerbank (1877, p. 456). To this Kirkpatrick (1900, p. 359) added the species *sweeti*. There are four species from the West Indies, ordinarily listed under the name of *Stelospongia*, which should be transferred to *Polyfibrospongia*. They are: *caliculata* Lendenfeld (1889, p. 503), *cribriformis* Hyatt (1877, p. 531), *maynardi* Hyatt (1877, p. 529), and *retiformis* Lendenfeld (1889, p. 490). Other species which should be transferred from *Stelospongia* to this genus include: *australis* Lendenfeld (1888, p. 166), *cava* Hentschel (1912, p. 440), *cavernosa* Schmidt (1862, p. 28), *cellulosa* Lendenfeld (1889, p. 500), *crassa* Lendenfeld (1889, p. 511), *cynci* Lendenfeld (1889, p. 512), *flabellum* Carter (1885, p. 305), *implexus* Ridley (1884, p. 384), *intertexta* Hyatt (1877, p. 532), *laxa* Lendenfeld (1889, p. 498), *levis* Hyatt (1877, p. 530), *lordii* Lendenfeld (1889, p. 503), *mirabilis* Lendenfeld (1888, p. 164), *ondaatjeana* Lendenfeld (1889, p. 504), *reticulata* Lendenfeld (1889, p. 510), *scalatella* Lendenfeld (1889, p. 490), *serta* Lendenfeld (1888, p. 163), and *vallata* Lendenfeld (1889, p. 499).

Polyfibrospongia echina de Laubenfels

The specimen most carefully studied, represented by U. S. Nat. Mus. No. 22482, was collected in very shallow water (less than one meter) near Bush Key Reef, June 30, 1932. A second was collected at a similar depth on August 1, 1932, near Bird Key Reef. The species is probably very common in the vicinity, but difficult to distinguish from other common species without actual histological study. The first specimen was collected in the belief that it was a specimen of *Hircinia strobilina*, which is abundant in the neighborhood, and the second was collected under the impression that it was *Spongia obliqua*, which also occurs in the immediate vicinity. Many others conspecific here may have been seen in the field but mistaken for one or the other of these two. *Echina* is massive, irregularly lobate. Both specimens are about 6 cm. in diameter and 11 cm. high. The texture is very like that of *Hircinia*, the external appearance is more like that of *Spongia*. The odor is very unpleasant, but similar to that accompanying both the other species with which it is here compared. The color is black outside, grayish drab within. The consistency is very spongy. The surface is shiny smooth, except for the conules, which are 1 mm. or less in height and 2 to 5 mm., usually 3 mm., apart. The widely scattered oscules are 2 to 4 mm. in diameter, often situated in shallow depressions. The pores are 80 to 100μ in diameter and about 1 mm. apart. The ectosome is densely packed with foreign material, is 30 to 100μ thick, and very tough. The endosome shows relatively little cavity; many large lumps of calcareous material 1 to 4 mm. in diameter are included, but otherwise the sponge is fleshy and soft. The flagellate chambers are subspherical, 25 to 40μ in diameter. The fibers are 300 to 1500μ in diameter, the larger in places being fenestrated, or rather may be said to represent groups of fibers parallel and close together with many short connections. These fibers are cored nearly to the edges with foreign material. The main meshes are rather symmetrically rectangular, about 1.5 by 3.5 mm., the long axis being directed toward the surface of the sponge.

As in occasional specimens of *Spongia*, there are present in this species numerous bodies 30μ in diameter, of a rusty yellow color, each containing a dark-brown spherule 5μ in diameter and a reddish spherule 7μ in diameter; presumably these are to be interpreted as being symbiont plant cells, probably algæ. It is not clear which of the two inclusions is the nucleus, if indeed either is. Can it be possible that these are responsible for the peculiar odor which is characteristic of those sponges in which they occur? In my observation, the odor is always present when these presumed symbionts are, but there are also cases in which the odor is associated with either very few or none of these hypothetical symbionts.

It is possible that specimens conspecific with the one under discussion were included with those studied and described by Hyatt, but from his descriptions this can not be verified. I have found from other places in the West Indies, species clearly conspecific with some described by Hyatt, such as his *Stelospongia cribriformis* (1877, p. 531), and in these cases they were clearly quite different from *echina*. This name is given because, together with other local species, this one is known by commercial spongers as "Hedgehog." *P. echina* was described by de Laubenfels (1934, p. 25) from Puerto Rico.

OLIGOCERAS Schulze

This genus is separated from typical *Spongia* by the presence of numerous bits of detritus or foreign material in the secondary fibers as well as in the primary ones. In fact, in exceptional cases there may be so much foreign material present that the skeleton itself resembles that of *Dysidea*, although the histological conditions in the two genera are very different. It is here suggested that two species ordinarily regarded as belonging to the genus *Cacospongia* Schmidt, namely: *Spongia lamellosa* Esper (1794, p. 270) and *C. spongeliformis* Wilson (1902, p. 403), be transferred to *Oligoceras*. This genus comprises in addition *arenosa* Thiele (1905 p. 479), *collectrix* Schulze (1879, p. 34), *foliacium* Poléjaeff (1884, p. 45), *paupera* Thiele (1905, p. 481), *sororia* Thiele (1905, p. 480), and *vosmaeri* Poléjaeff (1884, p. 44).

Oligoceras hemorrhages new species

Plate 6, fig. 2.

I collected the holotype, U. S. Nat. Mus. Cat. No. 22484, on June 30, 1932, near Bush Key Reef. A second specimen was collected east of Bird Key on July 10, 1932. Both were from less than 3 meters depth.

These specimens are massive, the first about 1 cm. thick and 6 cm. in diameter, the second about twice as thick but not so wide. The color in life and preservative is nearly black ectosome over dull drab endosome. A very conspicuous characteristic is the giving off, upon the slightest jostling, of great quantities of beautiful cerise-red exudate. This consists of submicroscopic particles which can not be centrifuged out. Upon standing it turns pale, and in two days becomes quite colorless. The consistency of the specimens is spongy, but very soft, easily compressed, and rather easily torn or cut. The surface is conulose, with conules about 1 mm. high and the same distance apart. The oscules are dubious; I find one opening 3 mm. in diameter and two only 1 mm. in diameter, but their nature is such that I consider it possible that they are mere ruptures in the dermis. The pores are 65μ in diameter, and are only moderately abundant. The dermis is some 35μ thick, appears to be of spongin, and contains very fine particles of foreign matter. The small flagellate chambers seem to be diplodal, and their diameter is about 25 to 35μ. There are abundant fibers 100 to 300μ in diameter, that are just masses of detritus loosely held together by invisible cement, and fairly numerous other fibers of spongin with only a few particles of foreign material included in them. The latter fibers are from 50 to 100μ in diameter. They branch and anastomose from time to time but do not make a regular reticulation. It is difficult to assign mesh sizes in this species.

This seems to be the only species of the genus recorded as yet from the West Indies, except *spongeliformis*. From others of the same genus it may be characterized as follows: It lacks the cloaca of *arenosa*, the frondose shape of *foliacium*, the cylindrical shape of *paupera*, and the tubular shape of *vosmaeri*. There seems to be inadequate data with regard to *sororia* for satisfactory comparison. The species closest to *hemorrhages* appears to be *collectrix* from the Mediterranean region, which has no trace of the peculiar "bleeding." *Oligoceras* (*Cacospongia*) *spongeliformis* Wilson (1902, p. 403), the other West Indian species, is a soft fibered one with very little detritus anywhere. It was pale and well provided with oscilatorian symbionts. From it and all other species of this genus, *hemorrhages* is sharply set off by the peculiar exudate.

SCOPE OF THE FAMILY

Other genera of what we may call typical Spongiidæ include the following: *Aulena* Lendenfeld is characterized by nodal detritus; the genotype should be designated as *villosa* Lendenfeld (1885, p. 309). *Druinella* Lendenfeld has fibers that are concentric, almost like those of *Aplysilla,* and contain some detritus. *Duriella* Row has main fibers that are trellised; this genus should receive as a new combination *Spongia idia* de Laubenfels (1932, p. 121). *Dysideopsis* Lendenfeld is something like *Oligoceras*; the flagellate chambers are very large, nevertheless they are technically to be regarded as diplodal. The genotype should be established as *Coscinoderma alta* Poléjaeff (1884, p. 52). *Halme* Lendenfeld has honeycombed structure with a "sieve" over the surface; the genotype should be understood as being *Holopsamma laminæfavorsa* Carter (1885 p. 212). *Hyattella* Lendenfeld is a genus established for Spongiidæ of cork-like consistency; the type, which is *Hircinia clathrata* Carter (1881 p. 365), is from the West Indies, as is also *Hyattella decidua* Lendenfeld (1889 p. 110). *Stenospongia* Burton (1928, Records of the Indian Museum, vol. 30) is established for very peculiar habitus. In the original description on page 134 its fiber is described as being not pithed, on page 135 as being pithed; in a personal letter to me dated February 2, 1934, Mr. Burton states that the correct statement is that there is no pith to the fiber. *Thymosia* Topsent has a skeleton of aggregated nodules of spongin.

Aphrodite Lendenfeld is a preoccupied name; it is also a synonym of *Hippiospongia. Cartilospongia* Bowerbank is unrecognizable. *Chondrospongia* Bronn is apparently a synonym of *Cartilospongia. Ditela* Schmidt may be a synonym of *Dactylia. Halmopsis* Lendenfeld is equivalent to *Halme. Pseudoceratina* Carter is not well enough known even for certain family allocation. *Taonura* Carter presumably is a synonym of *Spongia. Ventale* Oken presumably is a synonym of *Spongia*; the type of this genus should be established as *Spongia agaricina* Pallas (1766, p. 397).

In the family Spongiidæ there are also several genera closely related to the genus *Phyllospongia,* and another group (which I propose to establish as a subfamily) consists of genera closely related to *Verongia.* Still further there is a group possessing peculiar (keratose?) filaments which will be discussed in the following paragraphs.

HIRCINIA Nardo

The genus *Hircinia* superficially resembles *Spongia,* but has fibers more like those of *Polyfibrospongia.* The consistency is such that upon drying they do not make good commercial sponges at all. From all other species in the world they are sharply separated by the inclusion among the flesh of enormous numbers of peculiar (keratose?) filaments from less than 2 to 10μ in thickness, 4μ being common, but often as much as several millimeters long. At each end of these filaments is a ball-shaped enlargement about 3 to 15μ in diameter, 7μ being common. Although much study by many authors has been given to these inclusions, they are not well understood, it being not even certain that they are manufactured by the sponge itself; some have surmised that they might be connected in some way with symbionts. For lack of positive evidence to the contrary, however, I would give it as my opinion that they are proper constituents of the sponges in question. They are not directly attached to the fibers of the skeleton proper, but by their abundance they interlace and serve to knit the tissues very tightly together, imparting thereby great toughness to the specimens of this genus.

The question of the proper nomenclature of this group is very involved. To begin with there is the genus *Tragium,* of Oken (1814, p. 76). The first species he mentions is *hircinium,* which he adds equals *fasciculatum,* presumably meaning *fasciculatum* of Lamarck (1814, p. 372). Oken, it should be noted, was not describing specimens in a collection, but was classifying names based on the descriptions first made by other scientists. This latter sponge has been preserved in the Paris Museum and Topsent (1930, p. 16) redescribes it; it is an *Hircinia*. If we take this then as the type species of *Tragium*, the name *Hircinia* would fall to that of Oken. In view of the length of time that *Hircinia* has been employed, however, it would seem regrettable to have this occur, and I therefore propose that the utterly unrecognizable species *Tragium solida* Oken (1814, p. 76) be adopted as the genotype, thereby insuring that *Tragium* should remain forever unrecognizable. Other generic names more or less synonymous here include *Filifera* Lieberkuhn, *Stematumenia* Bowerbank, *Polytherses* Duchassaing and Michelotti and *Sarcotragus* Schmidt. The genus is very abundant in West Indian waters, most of the members thereof being referred to by the commercial sponge fishermen as "Hedgehogs." In my opinion the West Indian forms may be divided into at least four species, of which three occur at Tortugas. The fourth is a very ramose form, called *H. ramosa* by de Laubenfels (1934, p. 24). This name is preoccupied by Keller (1889, p. 345), consequently it is here proposed that it be known as *dickinsoni*, in respect to Mr. Malcolm Dickinson of the University of Southern California.

Hircinia strobilina (Lamarck) new combination

Plate 3; Plate 4, fig. 3.

This species is probably the most abundant of all the sponges in the vicinity of the Dry Tortugas, and is very common throughout the West Indies in general. It occurs up to low-tide mark, and below that down at least to a depth of 17 meters, as a specimen was dredged June 23, 1932, east of Loggerhead Key at that depth. The larger specimens are sometimes locally called "Loggerhead" sponges, together with the internally very different but superficially similar *Spheciospongia vesparia*. *Strobilina* reaches a diameter of at least 30 cm. and a height of 20 cm. The shape is typically that of a cake, with a group of oscules in the center of the upper surface, which may be either slightly concave or convex. Many specimens are, however, malformations of this theoretically ideal symmetry. The larger specimens frequently are more or less cup-shaped. It would seem that in old age the periphery grows upward at a faster rate than the central regions. Usually one side grows much higher than the other, producing formations somewhat like elephant ears. One such was dredged that was 5 cm. thick and 50 by 60 sq. cm. in area. The color is typically black above, gray below, with a gray-drab endosome, but shaded specimens, or those from a greater depth, are gray all over; apparently the black colors are associated with the rays of direct sunshine. A few specimens that I found growing near some submerged iron in the summer of 1927 were rusty red, that is, just about the color of iron rust. This is so rare that I believe it to be associated with the proximity of the iron. I believe that, whereas a sponge may have one color in direct sunshine and another in the shade, and may be affected in respect to color by chemicals in the surroundings, that nevertheless color has profound taxonomic significance, if and when it is reported as it occurred in life together with adequate data as to the environment. This species has a rank or fetid odor, very much like that of the commercial sponge, but even more intense. The consistency alive is very spongy indeed, but upon drying this species becomes hard and stiff and is not at all suited for commercial purposes. The surface is strongly conulose, even under water in active life, when a stream may be issuing from the oscules with great force. In my experience this species exhibits stronger oscular currents than any other sponge. Upon one occasion I put a large healthy specimen in the bottom of a large aquarium, and such was the force of the current issuing from its oscules that the surface of the water in the de Laubenfels, 1936

467 Corrections to de LAUBENFELS, 1936
sent to Burton by de Laubenfels.

The first number is the page, the second is the number of millimeters from the top of that page.

15 - 217 should be *Stelospongos*

17 - 75 should be *laminaefavosa*

Ditela is a synonym of *Spongia* (Keratosa p. 127)

Luffariospongia is a synonym of *Hyattella* (Keratosa p. 131)

Hircinia should be *Ircinia* (Keratosa p. 130)

19 - 134 should be *Ircinia fasciculata* (see Keratosa p. 66)

26 - ... two more West Indian species: *Thorecta laxus* and *Thorecta dendroides* both by Lendenfeld 1889.

30 - 206 Row redescribes it with diplodal, not eurypyllous.

32 - ... add West Indian *Darwinella joyeuxi* Topsent 1889.

33 - 143 should be *Psammaplysilla*.

35 - 196 add *Ochridaspongia* Arndt 1937 p. 637.

36 - 100 author was Carter 1881, not Arndt.

36 - 201 spell Schroeder or Schröder.

37 - 83 should be *paulula*.

45 - 220 add *Hemihaliclona* Burton 1937 p. 18

47 - 232 should be polyphyletic.

51 - 124 I now believe these are NOT synonymous.

54 - 55 should be *Desmacidon*.

57 - 205 should be *Patuloscula procumbens* Carter

58 - 260 *Plicifera* is a good species, quite different from *procumbens* as here confused.

59 - 130 add West Indian *Dactylia*, was *Chalinopsilla pilosa* Wilson 1902.

59 - 223 Burton had earlier established *S. fortis* as genotype.

62 - 153 should be *atypical*.

63 - 178 -fourth word should be "nor."

63 - 260 better to synonymize the second *Pronax* with Anchinoë and use Anchinoë.

64 - 65 should be *Plocamia*.

64 - 105 add the genera *Suberotelites* from p. 88 and also add *Zetekispongia*.

69 - 139 spell "microscleres."

69 - 220 add West Indian *Sigmadocia flagellifer*, described as variety of *Gellius vagabundus* by Vosmaer 1885 p. 28, see Lambe 1896 p. 185.

70 - 79 *Melophlus* belongs on page 159.

70 - 129 add West Indian *Xestospongia* was *Petrosia halichondrioides* Wilson 1902.

70 - 134 should be *Schmidtia*.

70 - 256 not *Eumastia* ~~by~~ but *Pellina*.

75 - 74 spell "triactinal."

75 - 223 after first 5 words add "to be called *Holoplocamia*."

78 - 88 spell "Plocamiidae."

85 - 70 *Myxichela* was established by de Laubenfels 1935 (Philippine sponges) page 331.

88 - 189 *Suberotelites* redescribed by Topsent 1938 p. 13 becomes a valid genus of Phorbasidae.

88 - 238 *Crellomyxilla* should go to Microcionidae, subfamily Yvesiinae, on p. 112.

95 - 115 *acanthostylifer* goes to *Iotroata* on p. 87.

95 - 119 *dubia* goes to *Iotroata* on p. 87

95 - 128 *spinosa* goes to *Iotroata* on p. 87.

98 - 245 *osburnensis* falls in synonymy to *Xytopsues* was *Desmacidon griseum* Schmidt.

102 - 49 "coring" not "coming."

102 - 75 should be *Phakellia*.

103 - 68 last word should be "genus," not "species." (the species is *madrepora* Schmidt 1870 p. 28).

104 - 227 should be *Thalysias*.

105 - 30 add West Indian *Thalysias*, was *Clathria jugosa* Wilson 1902 p/ 397, probably a synonym of *juniperina*.

110 - 215 *coronula* belongs in *Eurypon*.

opposite p. 116. Plate 14. 3d line of legend "Compare with Plate 15"

4th line of legend "with Plate 7."

117 - 241 spell "Suberitidae."

118 - 213 not *Hymeniacidon* but *Halichondria*.

119 - 110 omit the word "not."

119 - 157 -add the genus *Fisherispongia* de Laubenfels

120 - 183 this entire line should precede the line which it now follows.

125 - 205 not *Spongia juncea* but *Alcyonium junceum*

127 - 142 not "actual" but "axial."

128 - 153 after *Ptilocaulis* add the word "by."

130 - 248 *lobata* should go to *Isociella* (see page 153).

135 - 40 *Dragmatella* belongs here.

135 - 150 *Dragmatella* does not belong here.

137 - 103 *S. topsenti* belongs in *Ulosa* (see page 126).

143 - 228 not "Marshall" but "Mantell."

147 - 229 *Laxosuberites* falls to *Terpios*.

148 - 62 *coerulea* falls to *Terpios fugax*.

149 - 62 *microsclerus* falls to *Terpios fugax*.

153 - 137 let's keep *Rhizaxinella* as a valid genus.

153 - 248 should be *Melobesioides*

159 - 239 should be *Stellettinopsis*.

159 - 248 should be *Tethyorhaphis*.

161 - 103 *solidissima* belongs in *Monotria* (see page 179).

161 - 163 *Epallax* was by Sollas, not Gray.

164 - 87 not *seychellensis* but *diploderma* Schmidt.

164 - 270 add the genus *Taboga* de Laubenfels

165 - 58 Stylocordylidae can stand.

165 - 237 should be *Microscleroderma.*

168 - 209 add West Indian *Tribrachion* was *Tribrachium schmidtii* Weltner 1882 see Wilson 1902 p. 385. Also the genus *Monotria* (see page 179) belongs here.

169 - 98 add West Indian *Myriastra*, was *Pilochrota variabilis* Wilson 1902 p. 384 also *Myriastra*, was *Ancorina fibrosa* Schmidt 1870 p. 67, see Wilson 1902 p. 385.

175 - 119 note that minuta is West Indian.

176 - 96 should be Lepidospongia.

177 - 219 not by Gray, but by Grant.

178 - 64 Roosa falls in synonymy to Plakortis.

178 - 105 zyggompha falls in synonymy to simplex of Schulze 1880 p. 422.

179 - 197 this line gives an incorrect conclusion.

180 - 139 add Plakoosa de Laubenfels as a synonym of Plakina

182 - 219 nucula was found at Tortugas in 1936.

184 - 222 "strong and hard."

186 - add to Farreidae the genus Melittiaulus.

add the following West Indian species:

Farrea infundibuliformis Carter
Claviscopulia intermedia Schulze.
Dactylocalyx crispa Schmidt.
Diaretula muretta Schmidt.

187 - add the following West Indian species:

Scleroplegma herculeum Schmidt
" conica "
" lanterna "
" seriatum "
Aulocystis zitteli Marshall

187 - 91 there should be a space at this point.

187 - 181 " " " " " " " "

187 - 203 should be PLACOPEGMIDAE.

188 - 45 Euplectellidae (note spelling) may stand, does not require replacement.

add West Indian Euplectella suberea W.Thomson.

189 - 168 not new, but per F.E. Schulze 1886 p. 45.

189 - 215 latus is not eligible to become the type, the original designation contained only the one species elegans, which must therefore be the type.

191 - 85 add West Indian Hyalonema kenti Schmidt and Hyalonema toxeres Thomson.

191 - 253 Placodictyum is not sponge, but Echinoderm.

192 - 85 author is not Schmidt, but Blainville 1834 in the "Manual d'Actinologie"

194 - 67 add West Indian Sycaltis perforata Haeckel
also Leuconia, was Leucaltis curva Schuffner
also Leuconia, was Leucaltis crustacea Haeckel

196 - 99 Sycolepis falls in synonymy to Trichogypsia, which latter then becomes valid.

196 - 148 should be Scypha.

196 - 200 the page is 40, not "ca. p. 70."
add West Indian Scypha, was Sycandra barbadensis Schuffner,
also Scypha, was Sycandra villosa Haeckel
also Scypha, was Dunstervillia elegans Bowerbank.

197 - 140 add West Indian Amphoriscus, was Sycaltis ovipara Haeckel
also Amphoriscus, was Sycaltis testipara Haeckel
also Leucilla amphora Haeckel

197 - 216 Heteropiidae should stand.

→ 198 - 235 add West Indian Leucaltis clathria Haeckel

199 - 35 add West Indian Leucettusa was Leucetta corticata Haeckel.
also Leucetta, was Leucaltis floridana Haeckel.

200 - 82 Sycothamnus is a synonym of Leucetta.
add West Indian Pericharax carteri Polejaeff,
also Leucetta primigenia Haeckel.

201 - 84 spell "erroneously."
add West Indian Leucosolenia, was Ascandra panis Haeckel,
also Leucosolenia agassizii Dendy and Row,
also Leucosolenia, was Ascortis horrida Haeckel

203 - 123 second column, add pp. 319-333.

204 - 209 first column, should be vol. IV.

211 - 89 should this be 1930 or 1931 ? ? ? ? ? ? ? 1930.

213 - 106 should be Cavolinia.

213 - 151 should be Kallispongia.

219 - 97 first column, should be Halichondria.

221 - 249 probably should be *Placopegma*.

Some genera missed, are as follows:

Ircinia Nardo p. 519 - - replaces *Hircinia*

Trichaptella Filhol 1885 p. 28~~9~~4 maybe *Regadrella*.

Euhyalonema Ijima 1927 p. 6 see *Hyalonema*.

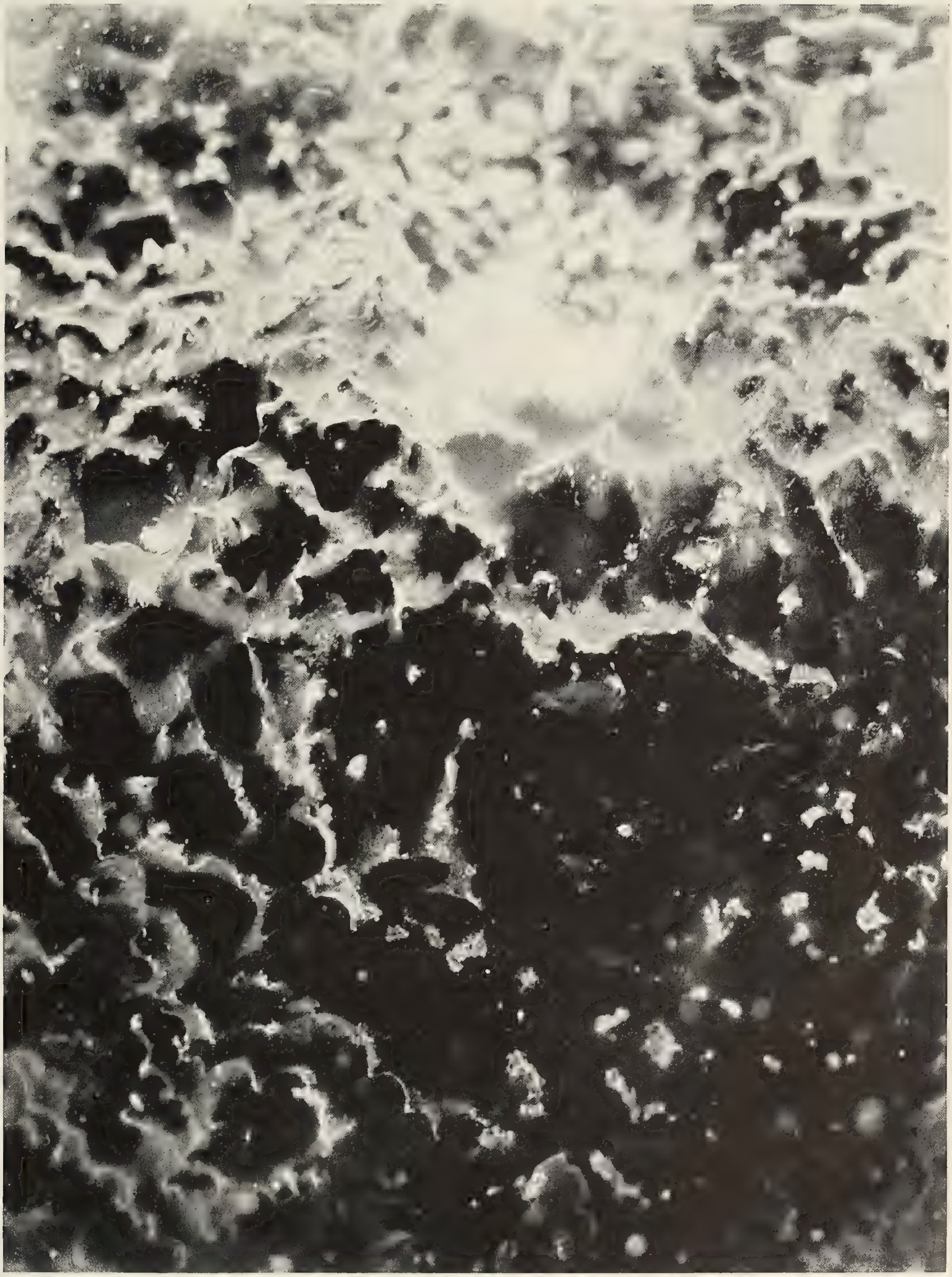
Leucalia Grant 1930 p. 844 needs investigation.

Pumicea Pomel 1867 p. 118 recent, but unrecognizable.

Lepirogeodia Pomel 1867 plate D. recent but unrecognizable

Pliochoanites Pomel 1867 plate C. recent but unrecognizable

also about 20 names by Lendenfeld, mostly nomina nuda, and otherwise unrecognizable. (Of course all genera subsequent to 1935 are omitted).



Hircinia strobilina. A "close up" of the surface of a healthy living sponge, still under water, not disturbed in any way affecting its appearance. This is reproduced slightly greater than life size, about as in Plate No. 2, which compare.

aquarium, instead of being level, was markedly convex or hill-shaped over the sponge. The conules mentioned above are 1 to 2 mm. high and 6 to 12 mm. apart. The abundant pores are about 90μ in diameter and 140μ apart. The oscules average nearly 5 mm. in diameter. The ectosome is relatively smooth except for the conules, noncellular, very firmly attached to the fibers and about 100μ thick. It contains scattered bits of foreign material of small size, such as broken spicules. The endosome is fairly well filled with ground substance and abundant flagellate chambers which are small, round, and 25μ in diameter. The filaments of this species as collected at Dry Tortugas, range from 1.5 to 3μ in diameter; exceptionally up to 5μ at the center of large filaments; the smaller diameters are taken nearer the ends. The fiber proper is not often cylindrical, but instead very irregular in trans-section, 150 to 1000μ in diameter, the widest regions being permeated by subcircular apertures 100 to 200μ in diameter, making what is known as fenestrated or fasiculated structure. These principal fibers branch and anastomose to make meshes 2 by 5 mm. to 3 by 7 mm. in size. Few, if any, special secondary fibers are in evidence in the specimens I collected of this sponge.

This species was originally described as *Spongia strobilina* by Lamarck (1816, p. 383), and the exact locality from which the specimen was collected is not known, though he surmised that it was Mediterranean. The species is set off from others by the extreme coarseness of its conulose structure and by its gray to black coloration.

Hircinia variabilis (Schmidt) Schulze

Plate 5, fig. 1.

This is one of the most abundant species in the vicinity of Tortugas, occurring in depths of 1 meter to at least 20 meters. The shape is frequently subspherical, but oftentimes there are long, more or less cylindrical branches. Occasionally the shape is roughly lamellate, and I have found one only that was very roughly cup-shaped. This was dredged from a depth of 17 meters on June 23, 1932, east of Loggerhead Key. The color in life is a dull olive-drab or brown, with more or less lavender tinges, giving the total impression that it is a mixture of green and lavender. The consistency is toughly spongy, extremely hard to cut or tear. The oscules are 3 to 7 mm. in diameter and show dark-walled cavities below them, and are therefore very conspicuous. They are never in groups, even in the one cup-shaped form referred to above. The pores are especially conspicuous, about 125 to 200μ in diameter, and are separated by strands often as narrow as 55μ. These and tough dermal fibers are the chief ectosomal specialization. The fibers are of spongin, but contain considerable foreign material, such as broken spicules. There is a noncellular dermis with foreign matter, and it is very firmly attached to the outer ends of the main skeletal fibers. These latter protrude and thus cause the conules, which are conspicuous even on the living sponge under water. They are 500 to 1000μ high and about 2 to 4 mm. apart. The odor is very much like that of other members of the genus *Hircinia*, a pungent, somewhat fetid, or sulphurous one. The flagellate chambers are small, round, about 30μ in diameter. The flesh is crowded with filaments 4μ in diameter and several millimeters long, terminating in large extremities as is characteristic of the genus. The skeletal fibers vary greatly in diameter, from 150μ occasionally to 800 or 900μ. It may usually be ascertained that the widest places are fascicular bundles of smaller fibers, each about 100μ in diameter, fastened together by so many crossbars and by meshes so nearly circular, that the effect is as of fenestrated sheets, with windows 100 to 200μ in diameter. Some small fibers are clear of detritus, but most have at least some sort of foreign material, sand

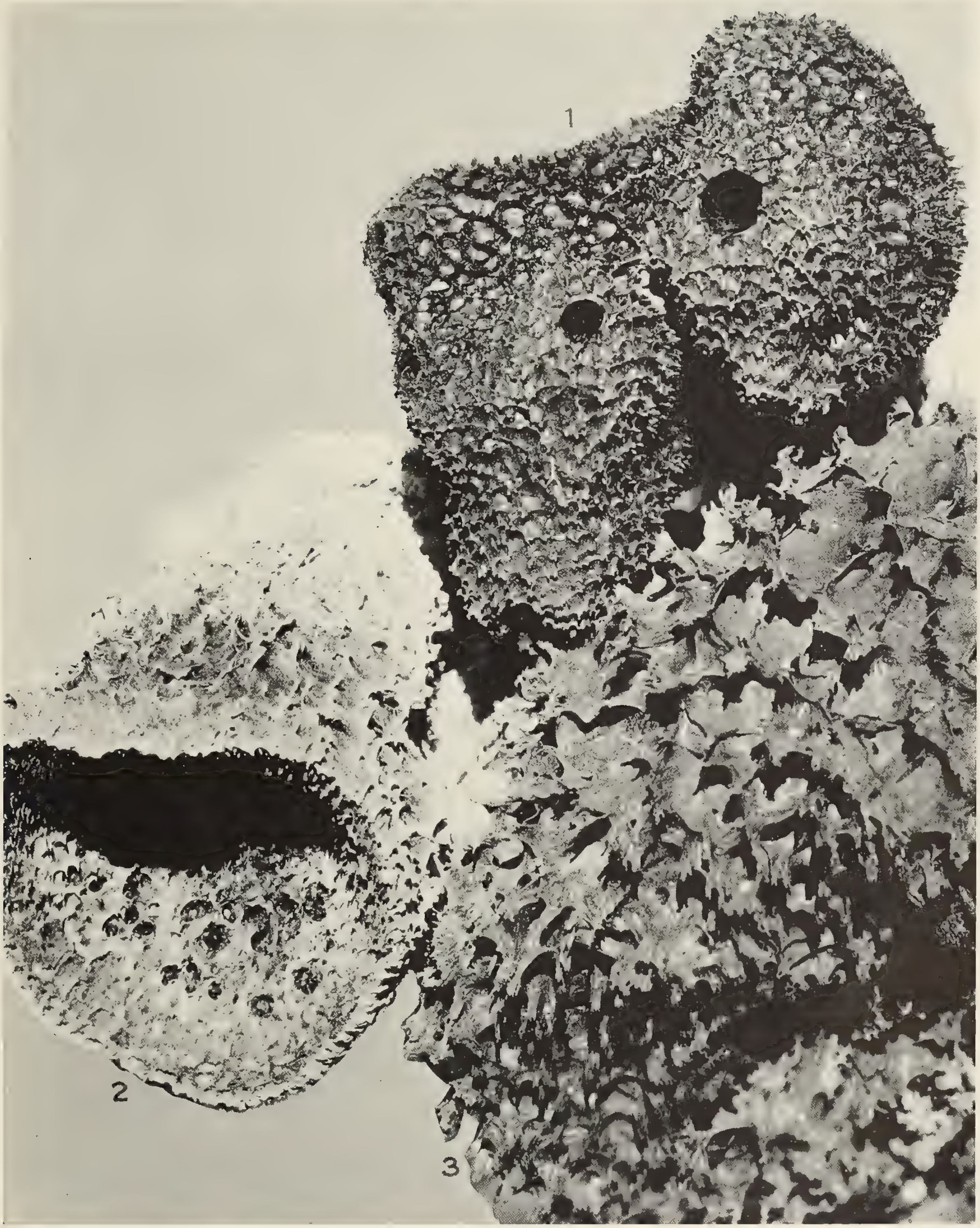
and broken spicules predominating. The main fiber makes meshes approximately 2 by 3 mm. in area. The fibers that may be termed secondary are not very abundant, but such do occur. They are 30 to 80μ in diameter.

The color is very characteristic of this species. The green pigment may be chlorophyll, as it dissolves readily into alcohol, leaving a more or less lavender residue. The fact that the oscules are never grouped sets this species off sharply from the following ones, even in the rare cases when this one is cup-shaped. Another feature, perhaps the most striking of all, is the very dark lining that shows just within the oscules or cloacal openings. Schmidt (1862, p. 34) described a sponge as *Filifera variabilis* from the Mediterranean region, and this was transferred to *Hircinia* by Schulze (1879, p. 13). There is very serious question as to whether the Mediterranean species is indeed conspecific with that here described from the West Indies. If one had numerous series of specimens from each region for critical comparison, sufficient differences might be found to justify establishing a new name for those from the American waters. That I do not do so at present is merely because I lack adequate European material to justify such a step. This species is not only abundant at Tortugas but also throughout the West Indies in general, and I have found it growing rather commonly as far away as at the Isthmus of Panama. Over all this range it shows as great variation within a few hundred yards as it shows over areas of several hundreds of miles.

Hircinia campana (Lamarck) Lendenfeld

Plate 4, fig. 2.

This species is consistently cup- or vase-shaped; even specimens as small as 6 cm. diameter by 9 cm. high are already calyculate. The rim is sharp, a thickness of 1 cm. is attained about 3 cm. below the rim; in other words a cross-section of the wall has an angle of about 20 degrees. A maximum height of at least 25 cm. is obtained with an associated diameter of some 15 cm. The color of the ectosome in life is a brown that appears to be a mixture of green and red. Put into alcohol, the green dissolves out into the fluid as is characteristic of chlorophyll; when left to decay in water the red material leaches out, tinting the surrounding fluid that color. In the living sponge, some patches are more reddish, others are more greenish. The endosome is a dull pale drab. The consistency is very spongy, tougher than the commercial sponges. The surface is coarsely conulose even when undisturbed in life, under water. The conules are 2 to 4 mm. high, they are distinctly closer together than in the case of *Strobilina*; in *campana* they are only 4 to 8 mm. apart. They are coarser on the outside than in the concavity of the sponge. The pores are conspicuous in the live sponge, being about 125 to 200μ in diameter and are separated by strands as narrow as 70μ. The perforate dermis is chiefly noncellular, presumably of spongin; it is very tough and contains some foreign material. The oscules are found exclusively on the inside of the cup and are 1.5 to 3 mm. in diameter. In places they are absent from areas of many square centimeters, again they may be as common as three per square centimeters. This sponge has the same fetid odor that is characteristic of so many species of the genus. The abundant flagellate chambers are subspherical, about 30μ or less in diameter. The flesh is crowded with filaments 3 to 4μ in diameter and several hundred micra long, terminating in slightly enlarged extremities. The main skeletal fibers are especially fasciculated and areniferous. The total diameter is 500 to 1100μ, making meshes 600 by 1800μ to 1000 by 2500μ. The component fibers are often 150μ in diameter and are densely packed with small bits of foreign matter, such as broken spicules. Their mesh is typically 100 by 350μ.



Hircinia. Typical dried specimens of the three common West Indian species of this genus, placed together for contrast, reproduced slightly greater than life size. Figure 1, *H. variabilis.* Note fine-grained surface, the very dark oscules; the shape varies greatly. Figure 2, *H. campana.* Note medium coarseness, and the localization of numerous oscules (not especially pigmented) within a concavity. Figure 3, *H. strobilina.* Note the very coarse surface and cake-like shape.

The main fibers extend toward the sponge surface and are held together by special secondary fibers roughly parallel to the surface, which latter are 50 to 100μ in diameter.

This species was described as *Spongia campana* by Lamarck (1814, p. 385), his specimen being presumably from the West Indies. It is interesting to note that like other members of the genus *Hircinia*, it is exceedingly difficult to macerate the skeleton. Even upon decaying for a long time, the original shape is maintained with the dermis still adherent to the main portion of the skeleton. The most striking characteristic of *campana* seems to be the consistently vase-like shape with the oscules always inside the concave area. In life the reddish-green-brown tints are very characteristic and constitute a good field or recognition mark.

* * * * *

The genus *Phyllospongia* Ehlers is sharply set apart from other members of the Spongiidæ by its peculiar external shape. The species belonging to this group are arranged in very thin sheets, like leaves, hence the scientific name. Members of this group are very uncommon in the West Indian region. Lendenfeld (1889, p. 190) records one which he calls *Phyllospongia arbuscula*, as in general from the West Indian region, but one wonders as to the accuracy of his report. The genotype of *Phyllospongia* should be established as *Spongia papyracea* Esper (1794, p. 38), there having been some possibility of confusion as to which species would be regarded as the official type.

Related genera include *Carteriospongia* Hyatt, in which the leaves anastomose; of this the genotype should be established as *Carteriospongia otahitica* Hyatt (1877 p. 540) which may or may not be the same as *Spongia otahitica* of Ellis and Solander (1786, tab. 59); another is *Leiosella* Lendenfeld, which is much less leaf-like than *Phyllospongia*. The genotype of *Leiosella* should be understood as being *L. elegans* Lendenfeld (1889, p. 212).

The following names require consideration, all probably representing synonyms of *Phyllospongia: Antheroplax* Lendenfeld, *Geelongia* Carter, and *Mauricea* Carter.

VERONGIINÆ de Laubenfels

The genera assigned to this subfamily are peculiar as compared to others of the Spongiidæ in that their fibers are not homogeneous throughout, instead they are clearly laminated (in concentric cylindrical layers) and divided into strikingly different portions, a peripheral semitransparent region and a more-or-less opaque pith within. In other respects, as for instance the gross and minute structure of the flesh, they are very much like typical *Spongia*.

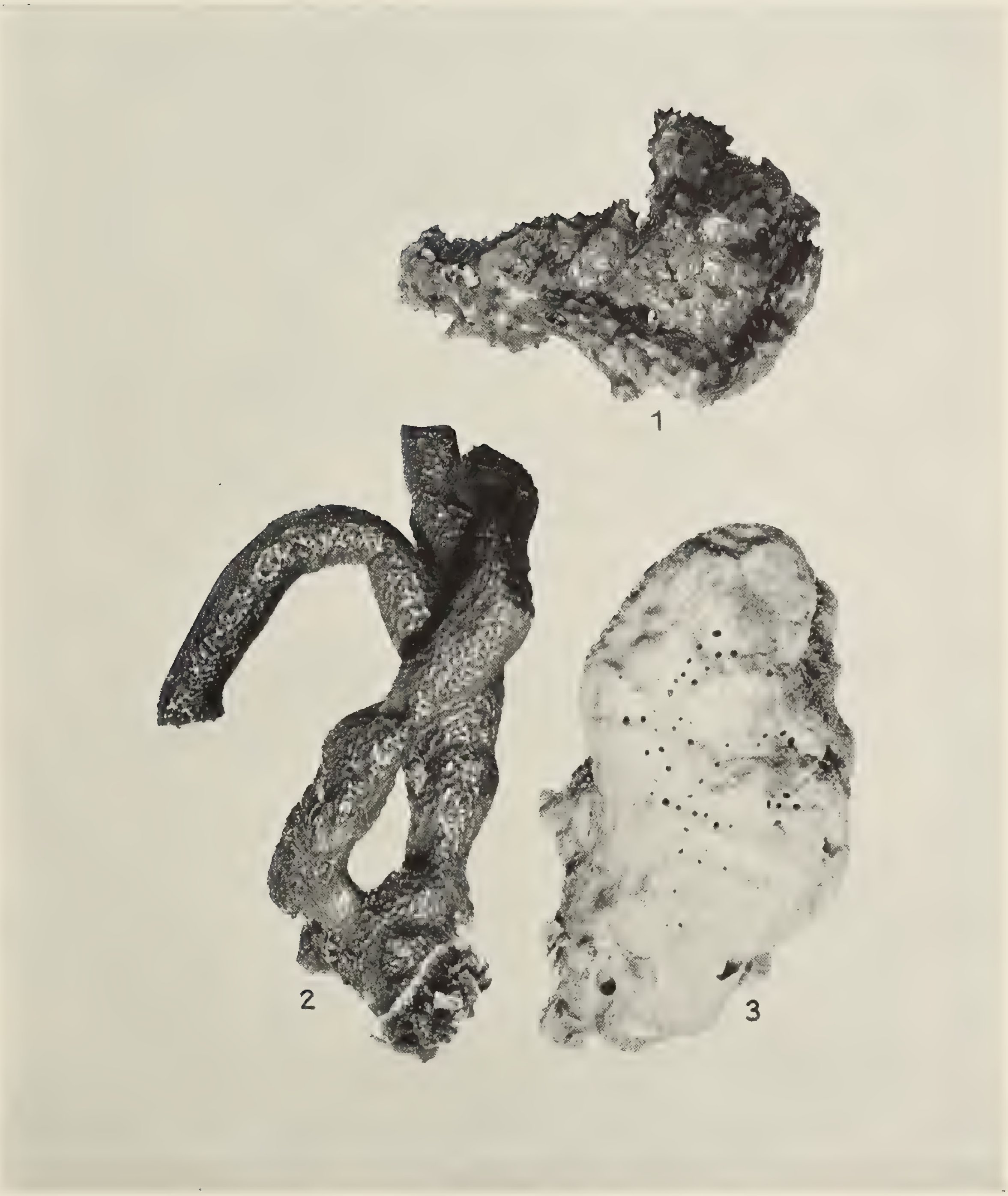
VERONGIA Bowerbank

This genus was established by Bowerbank (1845, p. 403) for genotype *Spongia fistularis* of Pallas (1766, p. 385) or rather that of Lamarck (1814, p. 435). It is frequently regarded as falling in synonymy to *Aplysina* Nardo (1834, p. 714) (where the name replaces his *Aplysia* of 1833, p. 519), but on the basis of printed descriptions the genus by Nardo is unrecognizable, and all his four species are nomina nuda. The diagnosis of *Verongia* is almost exactly that of the family. There are four or five West Indian forms in this group, of which the first is frequently in the form of hollow tubes which, upon dying, show polygonal saucers over the entire surface and also turn black. The second sort is the soft yellow ramose form so very abundant, it is noteworthy in that it turns dark blue upon dying. The third is the relatively hard, finely conulose, ramose form which shows little color change upon dying. The fourth is the more or less hollow gyriform type with fine small conules. A possible fifth one is red, but is it really of this genus? It was named *Hircinia flagelliformis* by Carter (1886, p. 372) and is not well known. The first one mentioned above was originally called *Spongia fistularis* by Pallas (1766, p. 385), later *Spongia tubæformis* by Lamarck (1814, p. 435), still later *Luffaria sebæ* by Duchassaing and Michelotti (1864, p. 59), then *Verongia hirsuta* by Hyatt (1875, p. 404), and *Aplysina prætexta* by Hyatt (1875, p. 405), and finally *Aplysina fenestrata* by Carter (1882, p. 272). The second one is not clear as to its nomenclature, inasmuch as there are Mediterranean and West Indian forms which may or may not be conspecific. Assuming that they are, the first name was *Aplysina ærophoba* Schmidt (1862, p. 25), which is Mediterranean, then *Luffaria fulva* Duchassaing and Michelotti (1864, p. 63), the first name given to the West Indian forms; later *Aplysina aurea* Hyatt (1875, p. 404), *Aplysina cauliformis* Carter (1882, p. 270), and finally *Aplysina fragilis* Wilson (1902, p. 408) apply to this species. The third form is uniformly referred to as *Aplysina* (that is to say *Verongia*) *longissima* Carter (1882 p. 271). The fourth was originally named *Luffaria archeri* by Higgin (1875, p. 223), then *Aplysina gigantea* by Hyatt (1875, p. 406), and *Aplysina spengelii* by Lendenfeld (1889, p. 421). In addition we find in the literature *Dendrospongia crassa* Hyatt (1875, p. 402), which is probably a *Verongia* but further than that is unrecognizable. Of these the second, third and fourth kinds are abundant in the vicinity of the Dry Tortugas, and will be described as follows.

Verongia fulva (Duchassaing and Michelotti) new combination

This is a rather common species from depths of only 2 or 3 meters, down at least to depths of 25 meters, as one was dredged from that depth on August 6, 1932, east of Garden Key. The shape is ramose, the branches usually being close to 1 or 2 cm. in diameter. There are only a few of them, frequently only one, so that the shape is that of the letter Y. The height is often in the neighborhood of 20 cm. The color in life is a bright yellow, changing on removal from water to a dark blue, and upon drying to a dark brown. The consistency is very fleshy, somewhat cheese-like, and slightly spongy. The surface is conulose, with conules usually scarcely 200μ in height, and only 400 to 700μ apart, often in linear rows, which outline smooth shallow concavities 2 to 5 mm. in diameter. This should be kept in mind in connection with remarks to be made below in comparing this to the species *fistularis*. The dermis is homogeneous, dense, about 30μ thick, and quite possibly consists of spongin. It is perforated with numerous pores, chiefly 40 to 80μ in diameter, but a few are as large as 135μ. The oscules are few and widely scattered, 2 to 5 mm. in diameter. They are located in smooth fossas, each of which is nearly 1 cm. in diameter, and these are often situated at the apices of the digitate branches. The endosome is rather dense, with the mesogloea fairly stiff. The very small spherical flagellate chambers are scattered through it, their total diameter being less than 20μ. All through the sponge are the conspicuous fibers, branching and anastomosing, but seldom enough so to permit symmetrical meshes, instead they are exceedingly irregular, both in size and shape. One might give as tentative measurements 500 by 1200μ. The fibers range all the way from less than 80 to at least 225μ in diameter. The pith in their center occupies from 40 per cent of their total diameter in the smaller ones to over 60 per cent of the larger ones, but there is so much variation from place to place within the sponge that only generalized statements are in order.

Duchassaing and Michelotti described this as *Luffaria fulva* in 1864 (p. 63), giving it as their opinion that their specimens were conspecific with *Spongia fulva*



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Cacospongia camera*. Figure 2, *Verongia longissima*. Figure 3, *Trypespongia columbia*.

of Lamouroux (1816, p. 83). While this can neither be proven nor disproven, the degree of doubt is so great that it seems by all means advisable to quote Duchassaing and Michelotti as authors. In those cases where authors of descriptions made more than a century ago have left type specimens, and these have been redescribed carefully, as for example Topsent's recent (1930-33) redescriptions of Lamarck's specimens, it is discovered that the real systematic relationship is very different from that which might have been imagined from the original account alone. The proper conclusion is to have very great hesitation in drawing conclusions from the excessively brief descriptions in vogue before 1840.

It is quite possible that *fulva* should be dropped in synonymy to the earlier *ærophoba*. Some systematists would hasten to do so at once. It may ultimately be necessary. I find no basic point of difference as I read Schmidt's description of *ærophoba*. Please notice, however, that there may really be significant differences which would be available were Schmidt's material better described. In various places in his works, Topsent has had opportunity to redescribe species of Schmidt's and often a decidedly new impression about them has resulted. If a considerable series of the Mediterranean *Verongia* be compared carefully with a considerable series of the West Indian *Verongia*, then instructive conclusions may be reached.

In this connection some comment on variation in the species is in order. If samples be taken from various places within the same sponge, great variation in size of fiber and proportionate size of pith may be easily noted. My conclusion is that these characteristics in this species are of little value. While under water with diving apparatus I have examined numerous specimens, perhaps fifty or more. I find absolutely no variation in respect to color, consistency, and conule pattern (size and distribution) that can be detected without the aid of instruments. The correlation between conule pattern and the fiber reticulation (average size and shape of mesh) was found to be very close wherever I investigated it. My conclusion is that within the genus *Verongia*, or at least within the limits of the species of that genus in the West Indies, that the critical bases for taxonomic differentiation are color in life, consistency (preferably in life), size and pattern of the conules, and size and pattern of the meshes of the main skeleton.

Verongia longissima (Carter) new combination

Plate 5, fig. 2.

One specimen of this sponge was dredged west of the White Shoal on June 23, 1932, from 15 meters depth. Another was dredged east of Garden Key August 6, 1932, from 25 meters. This is a ramose species with several branches and with anastomoses occurring between them here and there. The branches are only about 12 mm. in diameter and the total height about 32 cm. The color was dull yellow in life, in some cases at least, but soon after collection it turns carmine at the surface and drab in the interior. The total amount of color change is not conspicuous nor sudden. In alcohol the entire sponge has faded to dull drab-gray. The consistency is stiffly spongy, cutting rather easily. The surface is conulose, with the conules not quite 1 mm. high and a little over 1 mm. apart, rather evenly spaced. The dermis is homogeneous, noncellular, about 20μ thick. The oscules are 2 to 4 mm. in diameter, and 2 to 4 cm. apart, leading at once to several diverging canals about 1 mm. in diameter which show conspicuously as one looks down into the open oscule. There are no conspicuous fossas around the oscules. The endosome is rather dense, having small canals, with little cavities, and it is permeated by a fibroreticulation with very irregular meshes from 400 to 800μ in diameter. The fibers are rather uniform in size, being always fairly close to 150μ in diameter. The pith varies from 45 to 55 per cent of the diameter of the fibers, and is probably rather dense as it absorbs stains astonishingly little.

Carter (1882, p. 271) described this, as noted above, not as *Verongia*, but as *Aplysina longissima*. The synonymy has been discussed above in connection with the remarks about the genus *Verongia*. While this species seems relatively uncommon in the vicinity of Tortugas, I have examined very numerous sponges collected from the eastern portions of the West Indies, particularly north of Puerto Rico, and find that there it seems to be extraordinarily abundant, being almost the only *Verongia* occurring in that region.

Verongia archeri (Higgin) new combination

The Tortugas specimen was dredged August 16, 1924, at a depth of 35 meters, south of the southwest channel buoy. It is in general a cylindrical mass, 6 cm. in diameter, 20 cm. high, with a cloaca running medially almost the entire length. This cloaca is 14 mm. in diameter. The color in alcohol is a dull pinkish lavender. The consistency is stiffly spongy, very easily cut, but not easily torn. One of the most conspicuous features of this sponge is the system of deep grooves on its surface. These are about 5 mm. wide and 9 mm. deep. They are rounded at the bottom, but come to sharp edges above, so that in cross-section they are U shaped. They meander here and there, sometimes anastomosing and branching. The relatively flat areas of surface between them are some 8 mm. wide. They are not entirely flat, however, but conulose, with conules scarcely 350μ high and about 3 mm. apart. The dermis is noncellular, about 30μ thick. The flagellate chambers are small, round, diplodal, about 30μ in diameter. The fibers are remarkably uniform in diameter, about 120μ, of which only 10μ to 30μ make up the dark pith; it would average about 20μ. The reticulation is also astonishingly regular, with meshes rectangular, about 1 mm. in all dimensions.

As noted above, Higgin described this (1875, p. 223) as of the genus *Luffaria*. My observations are that this is much more common in the vicinity of Puerto Rico and the eastern part of the West Indies, than in the neighborhood of the Dry Tortugas. This, in my opinion, is much more closely related to *Verongia longissima* than to the other species of the genus, but differs from that markedly in its external form, though agreeing in color, color change, and structure of conules and fibers.

CACOSPONGIA Schmidt

This genus, of which the genotype should be understood as being *C. mollior* Schmidt (1862, p. 27), is not well known. It may merely represent abnormal specimens of *Verongia*, or again it may be so very far removed phylogenetically that it should be placed in some other family or subfamily than the Verongiidæ. The fiber shows a distinct lamellation of concentric cylindrical layers, which is very much like the condition in *Verongia*, but unlike the condition in this latter genus, there is no conspicuous pith present in the fibers.

In addition to the species to be described below, this genus is represented from the West Indian Region by the sponge first described as *Spongia cavernosa* by Esper (1794, p. 189) and referred to *Cacospongia* by Ehlers (1870, p. 6). Even with Ehler's redescription, however, the species is not easily recognizable.

Cacospongia camera new species

Plate 5, fig. 1.

The holotype, U. S. Nat. Mus. Cat. No. 22405 (now in two pieces), was dredged June 22, 1932, east of Loggerhead Key, at a depth of 17 meters. This is a ramose sponge with about eight digitate branches, each somewhat over 1 cm. in diameter and 7 or 8 cm. high. As brought to the laboratory a few hours after collection the color was dark plum at the surface, and a paler red, not at all purplish, in the interior. The consistency is softly spongy, limp and only moderately tough. The entire surface is given over to acute conules with smoothly rounded concavities between them. Each is about 1 mm. high and the apices are from 2 to (usually) 5 mm. apart. The dermis seems to be non-cellular. It is full of pigment granules, is about 30µ thick and, although readily detached, is so collapsible that it is to be handled only with great difficulty. There are irregularly scattered oscules, 2 to 3 mm. in diameter, and the microscope reveals pores 40 to 70µ in diameter, most often 65µ. It proves astonishingly difficult to study the flagellate chambers, even in material sectioned out of paraffine. It appears that they are absent from much of the endosome; a few structures were found that resembled rather small flagellate chambers, 25 to 30µ in diameter, but the majority seem to have been 45 to 70µ in diameter and oval, now much collapsed and distorted, perhaps (but not certainly) by the embedding and sectioning. Again it may be that the sponge was in somewhat pathological condition at the time of collection. At least in places throughout the sponge, were scattered crowds of worm-shaped inclusions, 3µ in diameter by approximately 100µ in length; they were packed with granules except that at distances of 3µ apart occurred very thin hyaline sections, producing an annulate appearance. These would appear to be symbiont Cyanophyceæ of the genus *Hormidium*, according to an identification made for me by Professor Yamanouchi of the University of Chicago. The fibers are remarkable; they are in obviously concentric layers, and as a rule have a large central region that is unstained. One might say that this was hollow, but whereas the outer (stained) surface is sharp and clean-cut in sectional views, the stained material blends softly to the unstained within. This might be accounted for thus, that the fiber was filled only with a dilute colloidal material, peripherally condensed as fiber, but medially still not condensed. The dense shell is 15 to 30µ thick, often 20µ. The entire fiber very often is 200µ in diameter, but occasionally is much thinner, or again may be nearly twice as thick.

This genus might be termed *Spongionella*, it being in doubt which was the earlier of the two names, that of Bowerbank or that of Schmidt, but too little is known about Bowerbank's to make it worth while to use his dubious genus. *Cacospongia camera* needs to be compared particularly to *mollior*, the type of the genus. It is exceedingly doubtful if any other species has ever been correctly assigned to this genus, because the peculiar nature of the fibers in the genotype has been overlooked by many subsequent authors. Where we have species of so-called *Cacospongia* not as yet transferred to some other genus, it is almost invariably for a lack of adequate data with respect to the species in question. Such do very probably need to be transferred elsewhere but it is not sure to which other genus. In comparing *camera* to *mollior*, we know of the latter only that it was black, spongy, reticulate, with oscules and fibers very like those of *camera*. I consider it highly probable that Schmidt's, which was from the Mediterranean, is not actually conspecific with this from the West Indies, and that if we had more data in reference to the earlier species we would find many points of difference between the two.

Scope of the Subfamily

The only genus thoroughly typical of the Verongiinæ is *Verongia*. *Aplysinopsis* Lendenfeld differs from typical *Verongia* by having sand in the pith of the fibers. *Auliskia* Gray is characterized by having branched pith; this may be accidental. *Cryptospongia* Burton is a deep-sea form, the specimen may have been macerated before being collected, it is not even certainly a sponge. In Burton's recent genus *Fasciospongia*, the fibers are pithed, the main ones being fascicular as in *Hircinia*. *Pseudobasta* Topsent is characterized by black stratified fibers, but without evident pith. *Thorecta* Lendenfeld may or may not have pith in its fibers, it is characterized by a dense sand cortex and a smooth surface. The genotype should be established as the sponge called by Lendenfeld *Thorecta woutan* which has recently been shown by Topsent (1930, p. 37) to be conspecific with *Spongia pala*. There are several names recorded from the West Indies in connection with this genus, including *dendroides* Lendenfeld (1889, p. 368), *galeiformis* Lendenfeld (1889, p. 367), and *laxus* Lendenfeld (1889, p. 362). *Thorectandra* Lendenfeld has detritus in the pith, and it is not clear how it differs from *Aplysinopsis*; its type should be established as *Thorectandra corticata* Lendenfeld (1889, p. 372).

Aplysina Nardo is utterly unrecognizable on the basis of the original author's description. Schmidt in 1862, discussing sponges of the Adriatic, described as *Aplysina*, species congeneric with Bowerbank's *Verongia*. Schmidt had seen Nardo's specimens and undoubtedly regarded his *Aplysinas* as being congeneric with the specimens so named by Nardo. It has been generally assumed that his surmise was correct. Sponges can not be determined accurately from external characters alone, however, in any save a few special cases. I have no confidence that Schmidt's guess was correct, and doubt that we are justified in dropping Bowerbank's well-described genus to *Aplysina* as Schmidt would have had us do. The utmost that seems permissible in speculating about the mystery is to leave the name *Aplysina* in the family Verongidæ as an unrecognizable genus.

Aplysia Nardo, a preoccupied name, is a synonym of *Aplysina*. *Dendrospongia* Hyatt is a preoccupied name and also probably a synonym of *Verongia*. The same may be said of *Fistularia* Bowerbank. The type of *Dendrospongia* Hyatt should be established as *D. crassa* Hyatt (1875 p. 400). *Luffaria* Duchassaing and Michelotti is probably a synonym of *Verongia*, but is unrecognizably described; the type of this genus should be established as *Luffaria sebæ* Duchassaing and Michelotti (1864, p. 59). All of the very numerous species of *Luffaria* described by Duchassaing and Michelotti are West Indian, but none is satisfactorily described nor represented by specimens that are available at the present time. *Luffariella* Thiele is probably a synonym of *Verongia*; its genotype should be established as *Luffaria variabilis* Poléjaeff (1884, p. 69). *Scyphia* of Oken is important in this conection. The first species listed by this author is *Spongia fistularis; Spongia fistularis* of Lamarck (1814, p. 535) has recently been redescribed by Topsent, and it proves to be a *Verongia*. If this be taken as the type of *Scyphia*, then *Verongia* must fall in synonymy to Oken's earlier genus of 1814. In order to forstall this rather regrettable contingency, it is here proposed that the utterly unrecognizable species *scyphiformis* Oken (1814, p. 77) be taken as genotype, thus insuring that *Scyphia* will remain unrecognizable. It is interesting to note that nearly two hundred fossil sponges have been ascribed to this genus, probably without any good reason, the only common item being the relatively unimportant one that they are all trumpet-shaped. *Spongionella* Bowerbank is quite possibly a synonym of *Cacospongia*, but we have inadequate data to be sure; in particular we do not know what the chamber system was. In Burton's recent genus *Thorectopsamma* foreign material takes the place of the pith in the fibers. *Verongula* Verrill is probably a synonym of *Verongia*. Its genotype should be established as *Aplysina prætexta* Hyatt (1875, p. 405).

DYSIDEIDÆ Gray

This family is separated from the Spongiidæ by the fact that the flagellate chambers are eurypyllous instead of diplodal. It is also noteworthy that fibers without foreign material are relatively rare, the typical examples having more foreign material than spongin.

DYSIDEA Johnston

This genus is very characteristic of the family in general, with large eurypyllous flagellate chambers, and fibers consisting mostly of detritus connected by small quantities of spongin. It was first termed *Duseideia*, but in the same article corrected to the above.

Dysidea fragilis (Montagu) Johnston

Plate 6, fig. 3.

This is only a very moderately common sponge in the vicinity of the Dry Tortugas. The material studied microscopically was put up from two specimens dredged on June 25, 1932, east of the White Shoals, at a depth of 15 meters. Each of these specimens is a cluster of subspherical units adhering together by connectives of less diameter than they themselves. The total mass is about 3 cm. to 6 or 7 cm. in diameter. Each of the subspherical units is about 2 cm. in diameter and has a large cloaca with apical opening. This cloaca and opening are 3 to 8 mm. in diameter. These openings are susceptible to closure, at least in part, by very thin sphinctrate membranes. The color is very pale drab, both living and in preservative. The consistency is softly spongy, easily torn and cut; much slime is produced in the latter case, as is true of various sponges in the family Desmacidonidæ. The surface is conulose, the conules are a little over 1 mm. high and about the same distance apart. The typical white fibers show at the conules, protruding from them. The dermis seems to be non-cellular and contains many minute bits of foreign matter. The pores were not made out, being very contractile. The flagellate chambers, with which the interior is abundantly provided, are oval and typically eurypyllous, varying considerably in size from 35 by 50μ to 50 by 70μ. The fibers are so full of foreign material that the spongin is practically invisible. The total mass of the fiber is about 100 to 200μ in diameter, the contained particles usually being about 40μ in diameter. The fibers make only a vague reticulation and are about 500μ apart.

This was described as *Spongia fragilis* by Montagu (1818, p. 114) and transferred to *Dysidea* by Johnston in 1842 (p. 187). It is a very cosmopolitan sponge, having been recorded from the original locality in Europe, also from South America, South Africa, India, the Phillipines, Australia and perhaps other localities. This is the first record for it from the West Indies. It is faintly possible that the Tortugas specimen might be regarded as a separate species because of the rather peculiar external shape, but the shape in question is not sufficiently different from the many varied shapes shown in other parts of the world to make it worth while, in my estimation, to establish a new name. *Fragilis* differs from most of the other species of the genus in the very fine size and closeness of the conules on its surface and in its gray color as compared to the rather brighter colors of other species.

Dysidea crawshayi new species

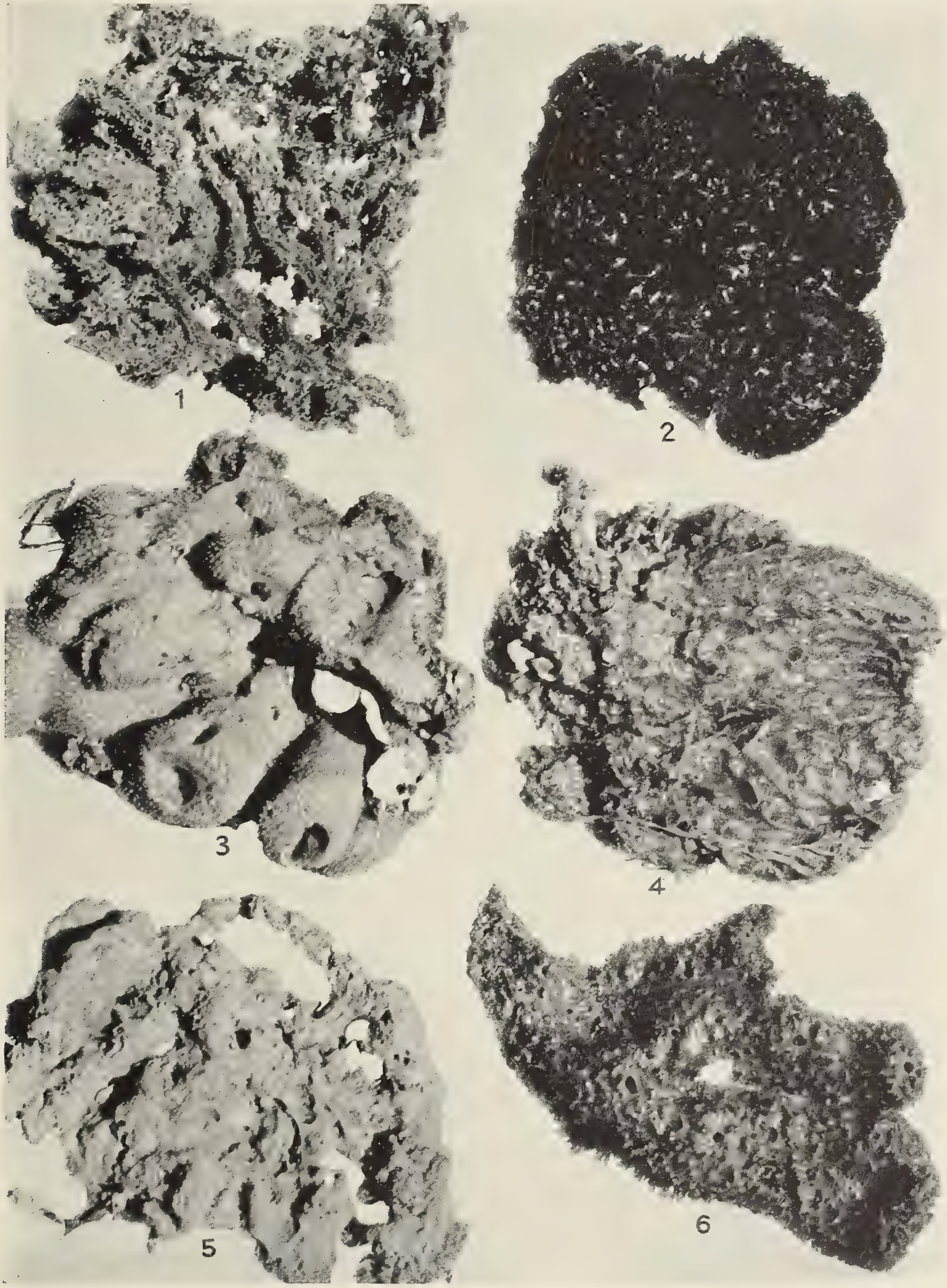
The holotype, U. S. Nat. Mus. Cat. No. 22454, was dredged June 26, 1932, from a depth of 70 meters, in the vicinity southeast of Loggerhead Key. This was a crust 2 to 5 mm. thick, on a piece of oolithic limestone, and covered about 10 sq. cm. of it. In life it was dull pale orange; it is elastic in consistency and cavernous in appearance. Its surface is covered with minute projections rendering the appearance slightly hispid, almost as though an ectosome had been present and then been lost in collection, but the placement of the sponge on the slab of rock was such as to render this highly improbable, and the data in connection with the collection record also indicates that nothing of the sort occurred. The endosome contains flagellate chambers that are eurypyllous, 40 to 70μ in diameter. The principal fibers are loaded with foreign material of about 40μ diameter, and the fibers reach a common thickness of about 100μ. There are a few smaller ones (40μ thick) that are clear spongin, without any foreign inclusions.

Even though there is only one small specimen of this species it is very distinctly marked and remarkable for several things, not the least of which is its color. Even more noteworthy, however, is its cavernous rather than conulose surface. That there are secondary fibers without foreign inclusions is by no means common in this genus. The species name is given in respect to Mr. L. R. Crawshay of the Laboratory at Little Abaco, Bahamas, West Indies.

Dysidea etheria new species

Plate 6, fig. 4.

The type material, U. S. Nat. Mus. Cat. No. 22408, was dredged from a depth of 17 meters June 22, 1932, east of Loggerhead Key. There were five pieces in the dredge haul, but that they represent a like number of original colonies is improbable. They are lamellate, with upright walls that often abut against one another at right angles. These walls are about 1 cm. thick and 5 cm. high. One of the five specimens was rather darker in shade than the others, and this one is massive, 2 by 4 cm. The color of all was a lovely sky-blue, hence the scientific name ascribed. The conules are white, due to the protrusion of the fibers, which are cored with masses of coral sand. These fibers ascend from within the mass of the sponge to the surface, and the flesh is sufficiently transparent that the reticulation of white fibers shows through from the outside as well as at the conules mentioned above. The consistency is softly spongy, very compressible, but with little tensile strength. In the lamellate specimen, the fiber tips project at the conules 1 mm. or more, and these are 1 to 3 mm. apart. In the massive specimen the fiber tips do not protrude so much and the conules are nearly twice as high and twice as far apart. There is a distinct leathery dermis about 50μ thick, full of pigment granules and some broken bits of foreign spicules tangentially arranged. The oscules may be closed by spincters and are so closed in most of the specimens. They evidently open to approximately 1 mm. diameter, however. Pores could not be made out, having evidently closed very promptly upon collection. There are bits of foreign matter in the endosome that are as much as 1 to 3 mm. in diameter, though these are not common. The principal fibers are merely coarse bits of calcareous sand, often nearly 1 mm. in diameter, loosely held together by small quantities of nearly invisible spongin. Their diameter is 700 to 1200μ. They branch at acute angles and irregularly anastomose, making a very irregular reticulation with meshes in the neighborhood of 2 mm. in diameter. There are some fibers here and there which may be secondary. They are of spongin, cylin-



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Psammascus psellus*. Compare this pseudo-keratose sponge with the other five typical (genuine) keratose sponges. Figure 2, *Oligoceras hemorrhages*. Figure 3, *Dysidea fragilis*. Compare this with the following. Figure 4, *Dysidea etheria*. Figure 5, *Coscinoderma lanuga*. Figure 6, *Euryspongia rosea*.

drical, about 150µ in diameter, and contain numerous small fragments about 35µ in diameter, often consisting of broken bits of siliceous spicules. The flagellate chambers are irregular in shape, nearly spherical to very elongated; representative sizes are 30 by 60µ and 60 by 70µ.

This species might be distinguished by its color almost unaided, for there is no other recorded species of exactly the same shade, although there are others of a bluish lavender. The coarseness of the contents of the main fibers is somewhat remarkable, but even more so is the chemical difference between the contents of the two types, the calcareous material being practically confined to the main fiber, and the siliceous to the smaller secondary ones. It is interesting to note that there were three species of *Dysidea* found in the vicinity of the Dry Tortugas, in view of the fact that to judge from the literature on the subject this genus is very rare in the West Indies.

EURYSPONGIA Row

This differs from other members of the family Dysideidæ by having relatively conspicuous secondary fibers with little or no foreign detritus coring them. It obviously intergrades with the older genus; as noted above in the description of the genus *Dysidia* (exemplified by *etheria*), there are occasionally such secondary fibers present there. It seems advisable, however, to retain the genus as a matter of convenience for species such as the one about to be described.

Euryspongia rosea new species

Plate 6, fig. 6.

Four specimens of this species were dredged in the summer of 1932, one, on June 17, southeast of Loggerhead Key, at a depth of 80 meters; one, the holotype U. S. Nat. Mus. Cat. No. 22428, on June 25, west of the White Shoals at 15 meters; one July 7, west of the White Shoals, at 20 meters; and the last July 22, southeast of Garden Key, at 25 meters. The latter was more ramose than the others, with digitate processes over 5 cm. long, and this specimen had a color that was slightly more purplish red than that of the others. In general this species is irregularly lobate, the lobes 1 to 2 cm. thick, up to 9 cm. high, and the total mass may reach a depth of at least 11 cm. The color in life is rosy red, with the exception noted above, and in alcohol fades to a dull pink. Over the surface, coarse white fiber tips show, producing tubercles or what may be termed conules; they are 1 to 1.5 mm. high, and about 1 or 2 mm. apart. The consistency is spongy, but weak, elastic, compressible, and easily torn. There is a sand cortex, 100 to 200µ thick, including not only grains of calcareous sand, but many bits of foreign spicules. There are relatively abundant oscules, often only 500µ in diameter, but up to at least 1.5 mm. There are other openings of small size, which perhaps could be interpreted as pores, many of which are 150µ in diameter. A puzzling situation exists, inasmuch as there are intergradations between these and the larger openings, so that there are apertures of quite a great variety in size. The flagellate chambers are eurypyllous, typically 30 by 50µ to 50 by 80µ in dimensions. That which may possibly be termed the main fiber of this species consists of thick strands of coarse foreign material, individual pieces of which are often more than 1 mm. in diameter, united by a relatively small amount of spongin. In fact, the entire interior of the sponge is very full of foreign stuff, so wide-spread as to be scarcely worthy of the name of fibers. Here and there throughout the mass, however, are bundles of clearcut secondary fiber, containing much spongin and only a little core of foreign inclusions. These fibers are about

50μ in diameter. As mentioned above, the condition is such as to present a picture deficient of any mesh pattern.

In 1864 (p. 106), Duchassaing and Michelotti described from the West Indies in the vicinity of St. Thomas, a species which they named *Euryades notabilis.* This is the genotype of *Euryades.* Beyond the fact that it was red, their description leaves us in almost total ignorance about it, but a specimen was preserved in the Museum at Turin. Study of this specimen indicates that it may belong to the genus since called *Euryspongia.* Because *Euryades* was a preoccupied name it could not be employed to replace *Euryspongia.* This synonymy is not absolutely certain, however, because the specimen referred to is so badly macerated that it conceivably might have been, for instance, an *Hircinia.* That it is conspecific with that here called *Euryspongia rosea* is scarcely likely in view of the great differences in the way of primary fibers. Duchassaing and Michelotti's specimen has very definite primary fibers, in which the spongin shows very plainly. It appears that the only other described species of *Euryspongia* is the genotype, *lactea,* Row (1911 p. 366), from the Red Sea. This is milky white, subspherical, but in many respects quite similar to *rosea. Dysidea semicanalis* Ridley (1884 p. 389) having a more honeycomb structure than rosea and different color, but being in some respects quite similar, also should be transferred to the genus *Euryspongia.*

Scope of the Family

In addition to the above mentioned three genera here assigned to the family Dysideidæ, there are also the following for consideration: *Ceratodendron* Marsh is clearly a member of the family Dysideidæ, but is otherwise unrecognizable. *Collospongelia* Ferrer-Hernandez may be a genus in which primarily siliceous spicules have been replaced by lumps of colloidal material termed colloscleres. The general appearance is as of a *Dysidea,* with the ordinary sand-filled fibers. Can it be that the subspherical colloidal masses are foreign inclusions? They are so very puzzling that it has seemed advisable pro tem to put this genus with the Dysideidæ in spite of their occurrence. *Euryades* Duchassaing and Michelotti bears much resemblance to *Euryspongia,* but since we do not know the chamber system, it is essentially unrecognizable. *Haastia* Lendenfeld; in this there were presumably sheaves of egg-shaped masses of silica around the fibers, but one can by no means be sure that such was really the case, in view of the fact that Hallmann (1914) in reviewing the sponges of the Australian Museum as described by Lendenfeld, reports that in many cases the actual specimens were very different from the descriptions originally made of them. *Heteronema* Keller is probably a synonym of *Hyrtios*; it has eurypyllous flagellate chambers, is conulose, with a conspicuous brittle cortex, the main fibers with many foreign inclusions and the secondaries which may or may not have any. *Hyrtios* Duchassaing and Michelotti, of which the genotype should be established as *H. proteus* Duchassaing and Michelotti (1864 p. 74), is an entirely West Indian genus. It has a coarse sandy ectosome over an endosome that is a fine reticulation with occasional sand inclusions. The difficulty of dealing with this genus is that as we have only dry specimens preserved and the chamber system is unknown, it may not even have been Dysideidæ, though this is highly probable. *Megalopastas* Dendy has fibers with no detritus at all, but has eurypyllous flagellate chambers; the fibers have a slight pith, which confirms the idea that this genus belongs properly in this family. *Sarcocornea* Lendenfeld is a synonym of *Dysidea,* as is also *Spongelia* Nardo, according to the redescription of this genus by Schmidt.

DARWINELLIDÆ Lendenfeld

This family has the general appearance of the other members of the Keratosa, for example is fleshy, with definite, probably inanimate, dermis often raised in abundant little conules. The skeleton is of elastic fiber, of the substances called spongin, but it is remarkable that in the genera assigned here the fibers seldom or never anastomose. As a result the pattern is dendritic; from a basal plate of spongin isolated trunks arise and branch repeatedly, the successive branches being smaller, each such fiber structure resembling therefore a little tree. The flagellate chambers are eurypyllous. As mentioned above, Topsent (1928) and other authors would make a separate order, the Dendroceratina, for this family. Note remarks below, however, as to anastomosing fibers in *Ianthella* and *Dendrilla*, typical members of this group. Many or all of the species referred to the family Darwinellidæ bear a strong external resemblance to species of the sub-family Verongidæ of the family Spongiidæ. It seems to me that this indicates something in the way of rather close relationship in spite of the fact that the flagellate chambers of the Darwinellidæ resemble those of the Dysideidæ. Further close relationship seems to be indicated to the family Halisarcidæ which lacks spongin fibers altogether, but otherwise has somewhat the same appearance as that of the Darwinellidæ.

IANTHELLA Gray

This genus has the general morphology, the same nature of the fleshy parts and pattern of fibers, as the above description. It is sharply set apart from all others in this family, however, by the fact that there are cells contained inside the more or less hollow fibers of spongin. These cells, if not actually alive at the time of collection, seem to have been alive recently, that is to say, it does not appear plausible to assume that the fibers grew about cells and smothered them; surely they would have decayed if this had been the case. With the dubious but possible exception of *Haddonella*, there seem to be no records of occurrence of cells within the fibers of any other than this one genus.

Ianthella basta (Pallas) Gray

This specimen was collected in the vicinity of Loggerhead Key August 3, 1927, at a depth of 4 meters.

It was purple in life and stained the alcohol a maroon red, so dark as to be practically black. The first label put in the jar with this sponge was also stained a brownish red, nearly black. The consistency is stiffly spongy, very tough. The surface is very smooth, except for the conules which are 500μ high and 2 to 4 mm. apart. The oscules are about 2 mm. in diameter. The pores represent the external openings of canals that extend into the sponge in a peculiar manner, to be mentioned below. There is a conspicuous lack of either sub-dermal cavities or ectosomal specialization. To be sure there is a dermal layer of a sort, probably an inanimate membrane, but the relatively solid endosome comes right up to it. Near the surface one can notice canals 25μ in diameter and about 100μ apart, perpendicular to the surface and practically straight for a distance of over 100μ. These communicate with the canals which meander through the interior of the sponge, some of which canals are as much as or slightly more than 1 mm. in diameter. The abundant flagellate chambers are about 25μ in diameter. The fibers are so scattered in the sponge that no reticulation is evident, although they often branch and very rarely anastomose. One would not expect this latter in members of this family, where such anastomoses do occur from time to time, however, but may be overlooked because of their rarity. The fibers referred to are often more than 1 mm. apart, and their thickness in the neighborhood of 250μ, of which the core is 180μ and the remainder only 35μ thick. The spongin is of a deep amber color, the pith is clear and granular and inside the bark, on the peripheral region of the core, are scattered black cells about 8μ in diameter.

This species was originally described as *Spongia basta* by Pallas (1766, p. 379) and transferred to *Ianthella* by Gray in 1869 (p. 51). It is worthy of remark that very numerous specimens collected and identified as of this genus seem to have been in rather poor condition at the time of collection. Does it happen that the cells in the fibers are associated with degeneration or pathological condition? Is this genus therefore just a collection of abnormal Aplysillas? Are the apparently healthy specimens of *Ianthella* merely those in which the degenerative condition has just begun? This question is worth noticing, but I regard the answer as probably properly negative, and therefore propose to continue treating *Ianthella* as a valid genus.

Scope of the Family

Other genera of Darwinellidæ that show some indications of possible close relationship to the genus *Ianthella* are the following: *Basta* Oken—unrecognizable. *Haddonella* Igerna Sollas—this differs from *Ianthella* in that it seems never to have any of the anastomosing fibers occasionally found in that genus and the inclusions in the fibers are dubiously cellular. *Igernella* Topsent—this is very like *Ianthella*, but contains detritus instead of cells in the fibers. *Korotnewia* Poléjaeff—this also contains foreign inclusions in the fibers, and according to Topsent should not even be put in his Dendroceratina. I leave it here only because equal doubt attaches to its location elsewhere; it should be noted that it is not thoroughly known. These four together with *Ianthella* might be regarded as a subfamily were not their nature in so many respects problematical.

Other genera more typical of the family Darwinellidæ comprise the following: *Aplysilla* Schulze is very much like *Ianthella*, but its fibers contain no inclusions within them; its genotype should be established as *Aplysilla sulphurea* Schulze (1878, p. 405). This genus is well distributed throughout the world, and is represented in the West Indies by the species *Aplysilla compressa* Carter (1882, p. 270). *Darwinella* Müller is like *Aplysilla* except that in addition to the dendritic fibers there are scattered bits of spongin in the shape of polyactinal horny spicules. *Darwinella joyeuxi* Topsent (1889, p. 17) is from the West Indian region. *Dendrilla* Lendenfeld is very much like *Darwinella*, but in addition to the respects in which it resembles that genus its fibers sometimes anastomose, thereby approaching the genus *Verongia*. The genotype of *Dendrilla* should be established as *Spongelia cacta* Selenka (1867, p. 565). *Pleraplysilla* Topsent is like *Aplysilla* except that the dendritic fiber contains much foreign material, in lieu of or inside the pith. *Psammaplysilla* Keller is characterized by having large areas with no skeleton whatsoever, thereby approaching the genus *Halisarca* and indicating, as mentioned above, a relationship between the Halisarcidæ and the Darwinellidæ. *Simplicella* Merejkowsky appears to be a complete synonym of *Aplysilla*.

PSAMMINIDÆ new family

The family Psamminidæ is here proposed for a group of organisms dredged by the steamer *Challenger* and described by Haeckel in the *Challenger* reports for 1889. These were collected from the deepest portions of the ocean and consist of a lot of sand, more or less connected by organic material. There is grave doubt in the minds of many students of the items in question as to whether or not they are really sponge at all!

Scope of the Family

All the genera but two, and all the species of this family are described by Haeckel in the one article (1889) and may be listed as follows, with the genotypes indicated, inasmuch as in most cases this has not been done before. *Ammoconia* (p. 29), type *auloplegma* (p. 31); *Ammolynthus* (p. 28), type *haliphysema* (p. 28). *Ammosolenia* (p. 29), type *rhizammina* (p. 29). *Cerelasma* (p. 45), type *gyrosphæra* (p. 46). *Cerelpsamma*, new genus, for two new species identified as of the genus *Holopsamma* by Haeckel, who (1889, p. 39) named them *argillaceum* and *cretaceum*; for *Cerelpsamma* I propose as genotype the species *argillaceum*. *Cerelpemma*, new genus, for two new species identified as of the genus *Psammopemma* by Haeckel, who (1889, p. 41) described them as *calcareum* and *radiolarium*; for *Cerelpemma* I propose as genotype the species *radiolarium*. *Psammina* (p. 34), type *nummulina* (p. 37). *Psammophyllum* (p. 49), type *flustraceum* (p. 51). *Stannophyllum* (p. 60), type *zonarium* (p. 62). *Stannarium* (p. 69), type *concretum* (p. 71). *Stannoma* (p. 72), type *dendroides* (p. 72).

HALISARCIDÆ Vosmaer

The family Halisarcidæ is erected for a very few species having no horny skeleton whatever, bearing a superficial external resemblance to the Keratosa, and having long eurypyllous flagellate chambers. See *Psammaphysilla* for comparison. This family seems to be very poorly represented in the West Indian region.

Scope of the Family

The three genera at present assigned to the Halisarcidæ comprise *Bajulus* Lendenfeld, supposedly different from *Halisarca* in not having branched flagellate chambers; *Halisarca* Johnston, the type of the family, and *Hexadella* Topsent, which has a leathery dermis.

HAPLOSCLERINA Topsent

In 1887 Ridley and Dendy in monographing the very important group of Monaxon sponges for the *Challenger* report, put all of the Monaxon genera other than those that they called Clavulina (since known as Hadromerina) into one sub-order which they called Halichondrina. They divided this into only four families, the first of which they termed the Homorhaphidæ and defined as having only diactinal megascleres and no microscleres. As mentioned elsewhere in this article, the recent tendency (exemplified by Burton in his report of the sponges of the Great Barrier Reef) minimizes the importance of the absence or presence of microscleres; in fact, the extreme step has been taken of advocating ignoring this factor completely. While I can not agree as to the complete lack of significance of the microsclere content for taxonomical purposes, certainly one of four major divisions of this large important group should not be based merely upon lack of microscleres. The simplicity of the megascleres is much more significant. Later Topsent elevated this group to the dignity of an order, which he termed the Haplosclerina, in his 1928 monograph of sponges collected by the Prince of Monaco. Serious doubt may be raised, however, as to the taxonomical importance of the group of sponges so characterized. Much of this apparent importance has been due to the multiplicity of genera and species assigned here in the literature, particularly by Lendenfeld. Hallmann, Burton and others have shown that a very large number of Lendenfeld's species were synonyms and many even purely imaginary, and the large number of names assigned here by more careful workers also is susceptible to explanation.

Students of sponges, investigating those species having only oxeas, were confronted with the possibility that these might all be the same genus or species. The specimens differed from each other only in matters such as coloration, which has been assumed by many authors to be of relatively slight systematic value, and in consistency, which it is difficult to describe precisely. In general, the number of intergradations was so great that to find any point of difference whatever necessitated being very meticulous. On the other hand, it has been rather evident that some distinction needed to be drawn, that some sponges having only oxeas were certainly not identical with each other, that various species were involved and that these needed to be separated somehow or other. Thus it happened that the pendulum swung to the other extreme; finer and finer distinctions were drawn and new names assigned on the basis of very minute differences. Actually the order Haplosclerina as strictly defined, comprises few other than the one genus *Haliclona*, and that this possesses more than twenty to forty genuine species may be seriously questioned.

The employment of an order to be termed Haplosclerina may be justified by the systematist, however, if the emphasis upon lack of microscleres be removed and attention be focused upon simplicity of the megascleres. There are, on the one hand, sponges in which different categories of spicules are localized here and there throughout the sponge, as for instance in a special dermal skeleton. On the other hand, in contrast to them, there are sponges having pretty much the same megascleres throughout, without special dermal skeleton or echinating spicules. I propose that we so define the order Haplosclerina as to include this latter group, regardless of the absence or presence of the microscleres. In this case the fresh-water sponges clearly belong here, whereas previously there has appeared to be some doubt as to which order should contain this interesting group. The family Desmacidonidæ would then also clearly belong to the order Haplosclerina, which is quite appropriate in view of the fact that some species of sponge in the genus *Haliclona* differ from species in the family Desmacidonidæ so very slightly that some argument may be raised as to whether they possess any right even to generic distinction.

In addition to the families Haliclonidæ, Desmacidonidæ and Spongillidæ, which are quite typical of the order Haplosclerina as here defined, it is proposed in this article to discuss under the general heading of Haplosclerina also the two families Callyspongiidæ and Oscarellidæ. As will be discussed later, these are by no means typical Haplosclerine sponges.

SPONGILLIDÆ Gray

This family as here considered is quite frankly defined as consisting of those sponges occurring normally in fresh or occasionally in brackish water. The majority of them, however, differ from all marine sponges in the type of gemmules formed. The reproductive bodies of the fresh-water sponges are provided with such very resistive capsules that they may resist a drought. Such gemmules are by no means always present, however, and there is a group of fresh-water sponges, which, aside from their habitat, are indistinguishable from marine sponges of the family Haliclonidæ. In general, the genera of the Spongillidæ seem to be very closely related to the marine genus *Desmacidon* and, were they marine, might be classified in the family

Desmacidonidæ. The megascleres are typically diactine and rather frequently spiny. The microscleres, when present, are commonly birotulate, that is to say, they are chelas in which the central shaft has not been displaced laterally as occurs in the chelas of the majority of those marine sponges of the class Demospongiæ which have them. In this respect the fresh-water sponges bear some resemblance to those of the class Hyalospongiæ. As is characteristic of the Haplosclerina in general, there is little localization of any particular sort of megasclere with reference to the architecture of the sponge, but there is great localization of the microscleres with reference to the reproductive bodies.

I have shown elsewhere (de Laubenfels, Carnegie Inst. of Wash. Pub. No. 435, 1932) that marine members of the family Haliclonidæ and of Desmacidonidæ are capable of symbiotic existence with unicellular plants. Van Trigt (1919) and many other authors have made clear that the majority if not all fresh-water sponges survive by means of similar symbiotic association with algæ. It is here suggested as being possible that sponges of the types represented in the families Haliclonidæ and Desmacidonidæ, wherever they occur, are capable of this association, and that because of this ability they have been able to live in fresh water, whereas other forms are confined to the sea. According to this theory, the family Spongillidæ has had its origin from marine sponges which happened to acquire this ability, not as a result of life in fresh water, but thereby permitting life where there is temporary drying-up at certain seasons of the year.

Needless to say there are no fresh-water sponges on the islands of the Dry Tortugas, nor at the present time do I find any reference to fresh-water sponges in the West Indies at all. It is conceivable that in some of the larger islands, such as Cuba, they may occur.

I propose to divide the Spongillidæ into two sub-families, the Spongillinæ and the Meyeniinæ.

Scope of the Spongillinæ

The typical genus of the family is *Spongilla* Lamarck, and closely related to it is *Nudospongilla* Annandale, differing from it in having extra large subdermal spaces. These two genera have a relatively simple spiculation of diactines only, some smooth, some spiny, or all spiny. It is interesting to compare them to the marine genus *Acanthoxifer*. The genus *Pectispongilla* Annandale is another of the Spongillidæ which is very like *Spongilla* but it is separated for the remarkable shape of its spiny gemmule spicules.

Reference is made above to a group of fresh-water sponges which have no special gemmules and may be very closely related to the family Haliclonidæ. The outstanding genera of this type include *Lubomirskia* Dybowsky, which but for the spininess of some spicules might even be of the genus *Haliclona*. Of this genus the type needs to be designated as *Spongia baicalensis* Pallas (1771, p. 710). Another somewhat similar genus, reading on paper even more like *Haliclona*, is *Potamolepis* Marshall, which has conspicuous spicular tracts of smooth diactines. Of this the genotype needs to be established as *Potamolepis leubnitziæ* Marshall (1883, p. 553 or 568). *Swartschewskia* Makushok is also very like *Lubomirskia*, but differs chiefly in the peculiar shape of the spines on the spicules. Two genera that are closely related to each other are *Cortispongilla* Annandale and *Pachydictyum* Weltner (1901). These, like *Haliclona*, have only unspined diactine spicules and relatively simple architecture. The latter differs from the first in not having a cortex. Each has a peculiar large central cloaca. A question has frequently arisen as to whether or not *Pachydictyum* was preoccupied by Ulrich in 1832, but the genus of Ulrich referred to is *Pachydictya* and because of the differences in the generic endings, according to the International Rules of Zoological Nomenclature, the one name does not preoccupy the other. (It would be otherwise were the names in question species names; those are treated as and obey the rules of adjectives.)

Other generic names that need to be considered here include *Euspongilla* Vejdovski, which is probably a synonym of *Spongilla,* and four genera which are unrecognizable; they are as follows: *Badiaga* Girtanner, *Baicalolepis* Makushok, *Eunapius* Gray, and *Somatispongia* Bowerbank. Some of these latter four may prove to be recognizable if and when more information is available. The genotype of *Eunapius* needs to be established as *Spongilla carteri* Bowerbank (1858, p. 315). That of *Baicalolepis* should be established as *B. fungiformis* Makushok (1927, p. 129).

MEYENIINÆ Arndt

This subfamily is established for sponges closely related to the genus *Meyenia,* having as a particular difference between them and typical Spongillidæ the possession of birotulate microscleres usually localized with respect to the reproductive bodies. In this microsclere content they show close relationship to the marine family Desmacidonidæ, many members of which (as for instance, the genus *Iotrochota*) possess similar birotulate microscleres.

The question arises as to whether or not all microscleres, even in marine sponges, be not similarly associated with reproductive bodies; this is a decided possibility, but difficult to prove. Several marine sponges reproduce throughout many months of the year, or even continuously, and again they do not have any one substratum of the adult set aside, as is true of some fresh-water sponges, for the reproductive bodies.

The Meyeniinæ appear to be a very compact and mutually closely related assortment of genera.

Scope of the Subfamily

The typical genus of this group is *Meyenia* Carter, which has relatively simple architecture, has only diacts for megascleres, and only one kind of simple birotulate microsclere with toothed edges to the discs. The type of the genus is here established as *Meyenia fluviatilis* Carter (1881, p. 92). This is probably not *Spongia fluviatilis* of Linné, which is an unrecognizable species. Closely related genera include *Acalle* Gray, which has two types of microscleres, which is also true of *Asteromeyenia* Annandale. *Anheteromeyenia* was established by Schröeder (1927, p. 108) as a subgenus of *Heteromeyenia*; it resembles the latter in most ways, but lacks the spined microrhabds. This, however, appears to be sufficient grounds for regarding the group as of full generic rank, and I therefore propose that it be so elevated. *Carterius* Petr may or may not be congeneric with *Heteromeyenia* (see below). *Corvomeyenia* Weltner and *Corvospongilla* Annandale are each characterized by having distinctive diactinal microscleres in addition to peculiar birotulates. *Drulia* Gray, which also has diactinal microscleres, is more readily characterized by the great difference between the size of the discs on its birotulates; its genotype needs to be established as *Spongilla brownii* Bowerbank (1858, p. 315). *Heteromeyenia* Potts has not only spiny megascleres and spiny diactinal microscleres but two types of birotulates; its genotype needs to be established as *Heteromeyenia repens* Potts (1881, p. 158). *Metania* Gray has two types of megascleres, a larger smooth and a smaller spiny diactine, but apparently only one sort of microsclere, a birotulate without teeth but with very different sized discs, as in *Drulia* and *Tubella*; its genotype needs to be established as *Spongilla reticulata* Bowerbank (1863, p. 455). *Tubella pottsi* Weltner (1895, p. 143) should probably be transferred to this genus. The genus *Parmula* Carter also lacks definite genotype designation hitherto and it is therefore proposed that *Spongilla batesii* Bowerbank (1858, p. 315) be so regarded. *Trochospongilla* Vejdovsky differs from *Drulia* in lacking the diactinal microscleres of that genus, and differs from *Metania* by having only one type of megasclere, also its microscleres are equi-ended. *Tubella* Carter is very like *Metania*, but might be separated from that genus in that it has oxeas rather than strongyles as megascleres. Its genotype is here designated as *Spongilla paulata* Bowerbank (1863, p. 453). Then the last of the typical genera of Meyeniinæ may be cited as *Uruguaya* Carter, which is characterized by the very odd shape of its birotulate microscleres.

Dosilia Gray has such unusual astrose microscleres in addition to the typical ones that it is scarcely to be regarded as typical Meyeniinæ. Its genotype needs to be established as *Spongilla plumosa* Carter (1849, p. 81), or if that species be regarded as inadequately described there, it may be quoted as of Carter (1881, p. 85).

The subfamily here discussed is frequently regarded as being represented by the genus *Ephydatia* instead of the genus *Meyenia*. *Ephydatia* was established by Lamouroux in 1816 for the genotype *Spongia fluviatilis* Linné (1759, p. 1348). In 1814 Oken established the genus *Tupha* for two species, *Spongia fluviatilis* of Linné and *Spongia lacustris* of Linné, which latter is the type of *Spongilla*; if it be accepted as the type of *Tupha*, then *Spongilla* must fall into synonymy with Oken's name, which would be most regrettable. Consequently I designate as type of *Tupha*, *Spongia fluviatilis* Linné 1759 p. 1348. By so doing I save *Spongilla* from falling into synonymy but render it necessary that *Ephydatia* must so fall. This is not a serious loss, however, inasmuch as the type of *Ephydatia* is an unrecognizable species. The sort of sponge which is ordinarily assigned to the genus *Ephydatia* fits perfectly with the genotype and diagnosis of *Meyenia*, a genus which has been in use some 45 years, and therefore no great violence is done to systematic practice by establishing it on a more firm basis than hitherto and dropping the genus *Ephydatia*.

Other generic names which need to be considered in this connection include *Carterella* Potts, which was preoccupied; *Carterias* Swarchewsky, which is unrecognizable; *Pleiomeyenia* Mills, which is a synonym of *Meyenia; Siphydora* James Clark, which is unrecognizable, and *Trachyspongilla* Dybowsky, which is a synonym of *Meyenia*, and of which the genotype needs to be established as *Spongia mülleri* of Lieberkühn.

HALICLONIDÆ de Laubenfels

The Haliclonidæ are the "Haplosclerina" par excellence. The sponges belonging here were, or would have been, in the family Homorhaphidæ in the above-mentioned classification of Ridley and Dendy. Not only are the megascleres simple, but there are furthermore no microscleres. By simple megasclere spiculation it is meant that there are rarely and insignificantly any other than diactines, and these of the same sort throughout all portions of the sponge. There is a notable lack of ectosomal or dermal specialization. Spongin fibers are often present, or again there may be merely small bonds of spongin uniting spicules point to point. In a few species there is so much spongin and so little spicule that the macerated skeleton answers almost or quite to the definition of a keratose sponge; in these cases the lack of dermal specialization, particularly the lack of a spongin-like cuticle, indicates the real relationship. On the opposite extreme which also occurs, namely, almost complete lack of spongin, the resemblance is to sponges of the order Halichondrina. It is by no means easy to identify such specimens. Recourse must be had to the presence or absence of a special dermal layer of spicules set off from those of the interior either by their arrangement or by their differences in size or shape. The family most closely related of all is the Desmacidonidæ. *Isodictya* of this latter family, for instance, in some specimens has very few of its characteristic chelas. These specimens are easily mistaken for *Haliclonas* and it is very probable that some sponges now identified in this latter genus have rare microscleres that were overlooked; if and when these are found, the correct generic diagnosis may be made. One is often strongly tempted to guess what missing microscleres may have been present and to identify a specimen that lacks them as of a genus which possesses them. This is not always entirely safe. I have had the experience of making such a prognostication only later to find the actual spicules and discover that they were not at all the expected ones. To return to the matter of relationships of the Haliclonidæ; through their obviously closest linkage, the Desmacidonidæ, they tie up with the Pœcilosclerina which differ only very slightly, in some cases, from the Desmacidonids.

HALICLONA Grant

This genus exemplifies to the fullest extent the diagnostic features of the family and is set apart from other genera of the group chiefly for such minor items as external shape. *Haliclona* itself is usually massive to ramose (young forms may be encrusting) while related genera have elaborately symmetrical habitus. The spicules are small oxeas and the structure is decidedly reticulate.

Burton in 1926 published in the Annals and Magazine of Natural History *Observations on Some British Species of Sponges Belonging to the Genus Reniera.* This article is very important to an understanding of the genus *Haliclona.* Previous to the publication of Burton's paper it had commonly been assumed that there were radical differences to be expressed by the generic names *Reniera*, *Chalina*, *Pachychalina* and *Ceraochalina*, between sponges having little, more, or still more spongin to the fibers. Reference should be made to page 417ff. in Burton's article in which he shows that the transitions from one to another of these so-called genera may occur within a single specimen. As sponges of the genus *Haliclona* grow older, they may not accumulate much spongin, but in some cases they do. This may well be used as a specific characteristic, but Burton is entirely correct in stating that it lacks sufficient taxonomic value to be used as a basis for generic distinction.

In the same article Burton depreciates the value of spicule size. It is of course, true, as he points out, that a spicule begins small and gradually attains its full dimensions, with growth in the sponge. Nevertheless in some species the maximum and average sizes attained are very different indeed from those attained in other species. At any one given instant there are both young and old spicules present. From my study of living sponges, extended over many months on various occasions, there is a notable lack of evidence of change in the average size of spicule during the postlarval lifetime of the sponge. A difference of more than 50 per cent in the average size of spicule very probably has value as a specific criterion.

Burton proceeds further to question the taxonomic value of colors. Near the Dry Tortugas I have studied literally hundreds of specimens of the genus *Haliclona*, and within each species there is practically no variation in color except on the part of pathological or abnormally treated specimens. Further remarks are made in connection with the species as these are herein described. Burton is absolutely correct when he states that an assiduous collector could obtain specimens of all shades of color, but it is noteworthy that the collector would need to be very assiduous, and the majority of his specimens for said hypothetical gamut of colors would be abnormal, diseased, or even dead and dying specimens. There is frequently one color in the light and a second in shadow, each quite distinctive of the species. As noted elsewhere in this article, color of preserved specimens means only a little; color in life, especially when accompanied by ecological data, is very important.

In connection with *Haliclona* we have as most common synonyms *Reniera* and *Pachychalina.* West Indian species first described as *Reniera* include the following that are essentially unrecognizable except as perhaps being of the genus *Haliclona: fortior* Schmidt (1870, p. 40), *hebes* Schmidt (1870, p. 40), *ascidia* Schmidt (1870, p. 40). *Reniera cœrulescens* Topsent (1918, p. 537) seems to be a valid species of *Haliclona,* not yet noted at the Dry Tortugas, but wide-spread elsewhere in the region. West Indian species originally described as *Pachychalina,* but not occurring at the Dry Tortugas include the following: *areolata* Wilson (1902, p. 392), from the description of which one can not be sure if it is a *Callyspongia* or a *Haliclona; variabilis* Dendy (1890, p. 353) which is described as so variable that one wonders if perhaps the author has really many species all at once under discussion. The five *Pachychalinas* which Verrill described in 1907, pp. 335-337 are not readily recognizable but if specimens can be found, might then be identified; their names are *cellulosa, elastica, micropora, millepora* and *monticulosa.* We have two West Indian species originally described as *Haliclona.* They are *H. pellasarca* de Laubenfels (1934, p. 23) and *H. podatypa* de Laubenfels (1934, p. 23), both from Puerto Rico.

Particular attention needs to be paid to a very wide-spread species of the genus *Haliclona,* which has customarily been referred to by the specific name of *cinerea.* Grant in 1826 (p. 204) named a sponge *Spongia cinerea,* but his description is rather inadequate. The first even fairly complete description to be used in connection with this species name is that of Johnston (1842, p. 111), where he calls the sponge *Halichondria cinerea.* Later Bowerbank, 1866 (p. 274) and again 1874 (p. 121), used the name for *Isodictya cinerea,* presumably a synonym of the species of Grant and Johnston. Burton in 1934 in his monograph of the *Sponges of the Great Barrier Reef* (p. 535) announces that he has found in the British Museum specimens of Bowerbank's *cinerea* and that these specimens are congeneric with Bowerbank's *Isodictia simulans,* which is the genotype of *Adocia,* and proceeds officially to designate Bowerbank's specimen as the neotype also of *Spongia cinerea* Grant. Mr. Burton has very kindly provided me with enough material for the preparation of microscopical material of this *Isodictia simulans,* the genotype of *Adocia,* and in 1928 I had the privilege of studying abundant specimens of the common sponge then known as *cinerea,* growing on the British Coast near Plymouth. The two are positively not congeneric; the latter is a *Haliclona.* I have studied many scores of specimens greatly resembling this from other parts of the world, particularly from Puget Sound on the North Pacific Coast of North America and from California in the Central West Coast of North America, from the Panama Canal region, and from the West Indies. These may or may not all be conspecific; they are certainly closely related, and are all *Haliclonas,* not *Adocias.* Their color is uniformly a lavender except in very unusual examples that show indications of being pathological, or profoundly modified by circumstances in their environment. An example of causes of unusual coloration is being overgrown by algæ or other sponges. They are softly spongy, rather slimy, contain practically no subdermal cavities or any special dermal reticulation. In contrast to the above, specimens of *Adocia* are crisply fragile, not very slimy, and have very wide-spread subdermal cavities. There is an evident dermal reticulation of special tangent spicules, although this is not always readily made out because of the fact that these spicules are of the same size and shape as those occurring in the endosome of the sponge.

Burton's action in 1934 (p. 535), above referred to, leaves a quandary. What name shall we apply to the cosmopolitan lavender sponge that we have been calling *cinerea*? Undoubtedly many of the species of *Isodictya* described by Bowerbank in his monograph of the British Spongiidæ (vol. 2 1866) belong to this species, as Burton shows in his above-mentioned article in the Annals and Magazine of Natural History. That one whose description in Bowerbank's works most clearly seems to be typical of the species now under consideration is his *Isodictya ramuscula*, described on page 314. This name is very unwieldy and difficult to use. It is almost equally certain that his *permollis* described on page 278, 1866, is also conspecific, although study of specimens in the British Museum might upset this assumption. Bowerbank says of it plainly, "Dermal membrane pellucid, aspiculous," but does not give the color in life, which is exceedingly important. He identified one or more specimens which Grant had labeled *Halichondria cinerea* as belonging to his new species *permollis.* Pending further study of British Museum specimens, I propose that we begin referring to the cosmopolitan lavender species as *Haliclona permollis* Bowerbank.

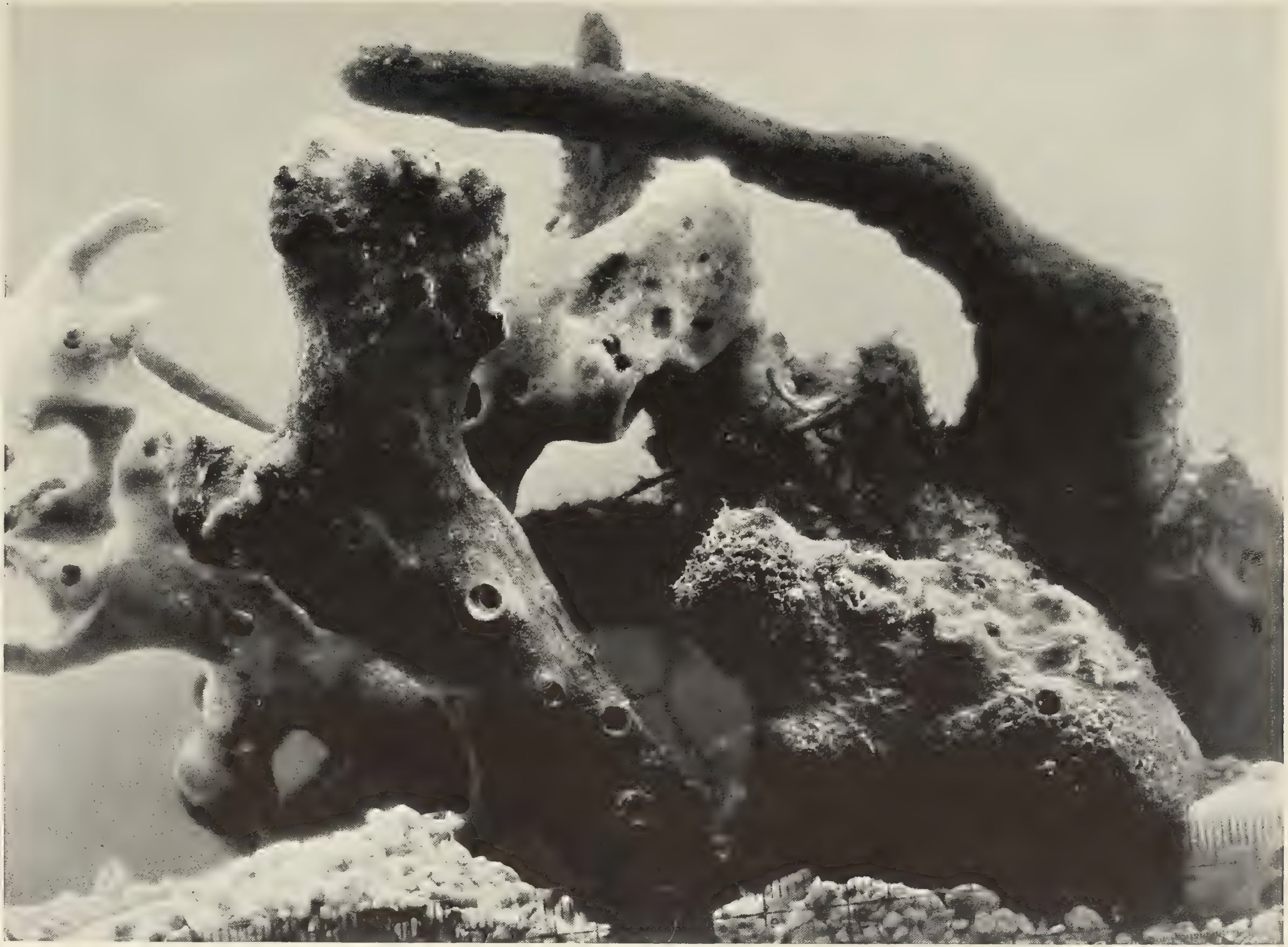
Esper in 1794 (p. 226) described a species as *Spongia clavata* which Ehlers in 1870 (p. 12) transferred to the genus called *Reniera.* This is probably not at all conspecific with the sponge which Levinsen 1886 (p. 351) described as *Reniera clavata* new species, and therefore a new specific name is needed for the latter. It is here proposed that it be known as *Haliclona levinseni.* Lambe (1893, p. 26) described a species of *Reniera* as *mollis.* Baer (1905, p. 14) described another species of *Haliclona* using the same name, and therefore it is here proposed that the second be known as *Haliclona bæri.* Marenzeller in 1877 (p. 364) described a sponge as *Isodictya tenera,* which Topsent (1913, p. 56) showed to be a *Reinera,* that is to say, *Haliclona.* Thiele in 1905 (p. 476) described another *Haliclona* as *Pachychalina tenera,* referred to by Burton (1930, p. 516) as *Reniera ignobilis,* as being a synonym of *Reniera ignobilis* Thiele. The two species being placed, at least temporarily, in the so-called genus *Reniera* (more properly *Haliclona*), a new name is needed for *Pachychalina tenera* Thiele, which it is hereby proposed should be called *Haliclona thielei.*

Haliclona rubens [Duchassaing and Michelotti] de Laubenfels

Plate 7, fig. 2; Plate 8, fig. 1.

This species is very abundant in the vicinity of the Dry Tortugas, particularly at depth of between 3 and 10 meters. I have never found it in a depth of less than 3 meters and only once in greater than 10, namely, on June 22, 1932, when one small specimen was dredged at a depth of 17 meters; it was not in any considerable respect unlike those from shallower water.

This species is nearly always cylindrical, and if more than 10 cm. high is usually branched at least once and perhaps even as many as four or five times. Curiously enough the shorter ones are frequently much thicker than the higher ones as though they were not younger individuals, but merely some that were growing laterally rather than in height. It occurred to me that these might represent a distinct variety and I attempted bringing together cells of that sort with those of the more ramose form. The readiness with which the two sorts of cells combined in re-uniting masses seemed to indicate exceedingly close relationship (conspecificity). The



Haliclona, under water, alive and healthy. Celluloid ruler photographed with specimens shows amount of enlargement. At left is yellow-green *H. longleyi*. At right is red *H. rubens*. In middle where they overlap, *longleyi* is in front of some branches of *rubens*. Note thicker branches, smoother surface and larger oscules of *longleyi*. Compare carefully with Plate 15, figure 3. Bottom here is coral sand.

diameter of the branches is usually about 2 cm., and some of the taller ones are as little as 1 cm. The height may certainly reach as much as 30 cm., possibly a little more. The color varies only from a strawberry red to a brick red. The specimens from shallow water are usually the least reddish in color. The red itself is always of exactly the same shade, the difference in external appearance being evidently due to the presence of a larger or smaller quantity of green specks. This is to say that the sponge itself has only one color, no more and no less, but there may be a varying number of green symbiont algæ present, the existence of which is indicated by physiological experimentation (de Laubenfels, 1932, p. 64). It may be commented that this species is very suitable for laboratory experimentation, not only because it is common, but also because it is hardy and survives in spite of handling and even abuse. The color is remarkably permanent in spite of various sorts of treatments, and fades very little even in specimens dried in the sunshine. Specimens kept in alcohol for years are still decidedly red. The consistency is very spongy, tough and hard to cut, as compared, for instance, to sponges of the commercial type. The oscules are abundant, often only 1 cm. apart, and usually have a diameter of about 3 mm. Their edges may be flat or very slightly raised as collars. There is no special dermal skeleton, the fibro-reticulation of the body merely ending at the surface with the fiber ends protruding from it about 100 to 200µ, resembling miniature conules 200 to 300µ apart. These, however, are not conules of raised dermis as in the case of the commercial sponges. Some naked spicules may or may not protrude from the exposed ends of the fibers. At the very surface is a scanty semi-fluid dermis not readily removable as it merely walls in the outermost meshes with a sheet of organic material scarcely 20µ thick. As seen from the outside, the outmost fibers appear as strands 30 to 70µ in diameter, inclosing meshes from 100 to 300µ in diameter. In the above mentioned surface film, occur nearly circular openings 30 to 100µ diameter which are probably to be regarded as the pores. The endosome is fibro-reticulate, with spongin tracts and many rows of spicules; the total fiber diameter is 10 to 60µ. The enclosed meshes are approximately 270µ in diameter. The pattern is moderately regular, the meshes approximating rectangular or triangular with rounded corners.

The spicules are oxeas usually 3 by 100µ, but in diameter often reaching 4µ and in length at least 117µ. This amount of variation is common among sponges. Of course there are always present, as expected, some much smaller forms which are probably developmental. The spicule is perhaps to be termed hastate, that is to say it is nearly cylindrical to within about 5µ of each end, from which point it tapers suddenly. Most of the spicules are in the tracts, but some occur loose in the flesh.

There are frequently present in the larger canals of this species symbiont Annelids belonging to the family Syllidæ. Externally the ecology of the species is to be associated with Gorgonians, like them growing up bush-like from a nearly flat sea-bottom of a coarse coral sand with occasional large pieces of dead coral, to which latter the sponges attach.

Pallas (1766, p. 389) described *Spongia rubens* from "America" of which no specimen is at present available. It is to be noticed that his description is so brief as to be practically valueless. Duchassaing and Michelotti (1864, p. 41) unrecognizably described the present species, identifying it with *Spongia rubens* of Pallas, which may or more probably may not be a correct guess. Identification of their species with this from the Dry Tortugas is only possible because they left a specimen in the Museum at Turin. Schmidt (1870, p. 37) described a sponge as *Pachychalina rubens* which he identified with *rubens* of Pallas. It can not be ascertained what his variety was, inasmuch as it appears that he left no specimen and as is true of the other early authors, his description is not reliable. The sponge from the West Indies which Carter in 1882 (p. 276) referred to as *Chalina rubens* may or may not be the species under question; examination of specimens would be necessary for decision. The first good description of this species is that of Wilson (1902, p. 392), under the designation *Pachychalina rubens* Schmidt. This was transferred to *Haliclona* by de Laubenfels 1932 (Carnegie Inst. Wash. Pub. No. 435, page 59).

Rubens is a typical *Haliclona*; it differs from *oculata*, the genotype, chiefly in color, coarseness and slightly greater average number of spicule rows in the fiber. Should this latter be employed as a basis for generic separation? Minchin (1900, p. 139) regards such differences as of very great significance. He illustrates three supposedly distinct types as "Reniera," "Pachychalina," and "Chalina." They are not restricted to different sponges, however, but as has been shown (de Laubenfels, 1932, p. 120) two or more of these types may be found within one individual. I believe we may justifiably separate species from each other for such traits as being "predominantly renierid" or "in most of the older portions chalinid," yet it is quite likely that with age, various of these architectures successively appear. I doubt that a difference of so small a degree and so transitory a nature should have generic rank.

Haliclona viridis [Duchassaing and Michelotti] new combination

This species is common in shallow water east of Bird Key, especially at a depth of about 2 to 4 meters.

It is ramose, unless it is just beginning to establish itself. The branches are 2 cm. in diameter, the height up to 5 cm. or perhaps in exceptional cases a little more. Occasionally there is a mass as much as 11 cm. across, with only the beginnings of branches rising above the surface. The basic color is a blue-green or blue, but in addition there is a certain amount of variation due to a larger or smaller quantity of symbiont algæ present so that some specimens are scarcely bluish at all because they have more of the plants present. In alcohol the color is a very dull lavender. The consistency is very soft, quite elastic to pressure, but very easily torn; if suspended under their own weight the specimens fall apart when out of water. The surface is fairly smooth, and is in many respects very like that of the previously described species *rubens*. The oscules are numerous and conspicuous, about 3 mm. in diameter, with collars ordinarily raised about 1 mm. about them. The ectosome is remarkably free from specialization; the reticulation merely terminates. Some spicules protrude perpendicularly from the surface at distances of 100 to 200μ apart. The pores are circular apertures 95 to 338μ in diameter. The variation in size is such as to make it practically certain that they open and then close, perhaps by sphincter action. It is impossible to remove any dermis intact; this is quite characteristic of the genus *Haliclona*. The endosome approaches the "crumb of bread" structure. There is a great deal of somewhat vague isodictyal reticulation and some equally vague tracts of spongin with many rows of spicules, the total diameter of each such tract being about 50 to 100μ. It is difficult to describe size or shape for the meshes because, as mentioned above, these are very irregular. There are rather numerous gross chambers somewhat over 1 mm. in diameter.

The spicules are exclusively oxeas about 4 by 120μ; very few may be as large as 6 by 150μ. In at least some specimens there are also oxeas present less than 1μ in diameter and about 70μ long; these are almost certainly immature forms of the principal megascleres though there is just a faint suspicion that they might possibly be regarded as microscleres. This latter, however, is rendered improbable by the presence of numerous intermediates and a great variation in abundance of the smaller sizes.

This species was first described as *Amphimédon viridis* by Duchassaing and Michelotti (1864, p. 81). As is true of practically all the descriptions in their work, it is so inadequate that no sponge can be identified from it alone, but specimens were left in the Museum of the University of Turin. In 1902 (p. 390) Wilson described a sponge from Porto Rico as *Pachychalina mollis.* His description is so very good that one may be confident that it is the same species as *viridis* of Duchassaing and Michelotti. The only difference is the negligible one that its spicules were ordinarily of the larger size range, namely, about 7 by 140µ; this is not at all to be regarded as a significant deviation from the type found at the Dry Tortugas. Although suitable for physiological experimentation, this species is not quite so hardy as *Haliclona rubens,* its cells dying when kept under artificial conditions much sooner than those of the red species.

Haliclona subtriangularis [Duchassaing and Michelotti] de Laubenfels

Plate 14, fig. 3.

This specimen was dredged July 22, 1932, from a depth of 25 meters, southeast of Garden Key. It is a cylindrical shaped sponge, perhaps a branch from a ramose colony. Its diameter varies from 1 to 3 cm. and in many places it is nearly triangular in cross-section. It is 13 cm. long. The color in life is dull yellow with faint rosy tinges here and there. The consistency is softly spongy, rather easily torn, but not easily cut. The surface is smooth, except that it is very obviously reticulate. The oscules are 2 cm. apart and 3 mm. in diameter. The pores are represented, no doubt, by the open meshes of the dermal reticulation; this latter consists of fiber of about 25µ diameter, but varying greatly in spicule content. In places the spicules are in a single row, and in others there may be upward of 20 rows of coring spicules, so that the fiber is filled with them. These fibers make reticulation with meshes from 70 to 440µ in diameter. The endosome is almost "crumb-of-bread," with very evident skeleton. Its fibers contain much spongin with only a few, say 4 to 7 spicule rows, and vary in diameter from 15 to 65µ. The mesh diameter ranges from 80 to 200µ. The spicules, which are mostly in the fibers, but in a few cases are loose in the flesh, are oxeas ranging in size up to 5 by 130µ, hence are definitely larger than those of the somewhat similar *Haliclona longleyi* (see below). The type specimen in the University of Turin has spicules still larger, 7 by 140µ.

The other local sponge most to be compared to *subtriangularis* is *longleyi. Subtriangularis* is much the spongier of the two, is reddish yellow instead of yellowish green, has a much more openwork surface, and upon direct comparison the pattern made by the fibers is recognizably different although not in such manner as to be susceptible to simple description in words.

This species was described as *Thalysias subtriangularis* by Duchassaing and Michelotti (1864, p. 85) and transferred to *Haliclona* by de Laubenfels, 1932 (Carnegie Inst. Wash. Pub. No. 435, p. 55). It is represented by a specimen which has been preserved in the Museum at Turin. Duchassaing and Michelotti in 1864 credited this species to Duchassaing (1850, p. 26), but no specimen is available for this as earlier described, and it is by no means certain that the earlier description was of the same species. In 1870 (p. 44) O. Schmidt described a West Indian sponge as *Schmidtia aulopora,* giving a very brief description, which for instance, does not even mention spicule size. Enough is stated, however, together with his very crude illustration, to make it clear that his *aulopora* is probably either *Haliclona subtri-*

angularis, or else *Haliclona longleyi*, the species to be described next. Schmidt gives as his opinion that his is a synonym of the earlier *subtriangularis* and in 1932 (*loc. cit*, p. 55) I have suggested that this synonymy be established in spite of the fact that we are not quite one-hundred per cent certain with regard to it.

Haliclona longleyi de Laubenfels

Plate 7, fig. 1; Plate 8, fig. 2.

This species has been extremely common in depths of from 1 to 3 meters just north from Bush Key reef. In 1932 it was found to be less abundant than had been previously the case. It may be that much collection for physiological experimentation has reduced this species significantly in abundance in the vicinity of the Dry Tortugas.

In shape *longleyi* is usually more or less ramose, but is repent rather than erect. Portions of the growth may, however, be somewhat lamellate or there may be few or no branches; as a rule there are about a half dozen. These branches may again anastomose. The thickness is usually from 2 to 4 cm. The height often reaches as much as 18 cm. The color is superficially yellowish green. The consistency is slightly elastic, but chiefly fragile, breaking or tearing as easily as wet pasteboard. The surface is practically smooth. The oscules are 2 to 4 mm. in diameter, often with slightly raised collars; they are moderately numerous, but of very uneven distribution, averaging about 3 cm. apart on the upper surface but occurring only rarely on the lower side. At times they are grouped only 1 cm. apart and then again they may be absent from an area as large as the palm of the hand. The pores occur in the meshes between the outermost fibers; most are about 65µ in diameter, but a few are as much as twice that size, others only half so large, and they are about 180µ apart, center to center. The cells are rather close together at the surface, hence make there a denser layer than the rest of the sponge, about 50µ thick. At the very surface, groups of three or four spicules stand erect, practically their whole length protruding, and about 40 to 150µ apart. The endosome is fibro-reticulate, the fibers criss-crossing to make a spider's web pattern as seen in transverse sections, but a rather rectangular mesh as seen in longitudinal sections. The ascending fibers are 100 to 120µ apart and 30 to 40µ in diameter. The inter-connecting fibers are very slightly smaller. The flagellate chambers are subspherical, 25 to 30µ in diameter. The upper surface is a bright greenish yellow, which color extends down slightly more than 1 mm. below the surface. On the sides the zone given over to this tint is much thinner, and on the under side, that is to say, away from the sun's rays, it is practically absent. Just below the yellow-green layer, all around the sponge, and coming to the surface on the shaded side is a dark olive-green zone where the symbiont plants are most abundant. These are cyanophyceæ belonging to the genus *Chroococcus*. The medullary regions are very pale greenish or yellowish drab. The dried sponge turns almost white but often is slightly tinged with lavender. In alcohol the color fades greatly, but retains a slightly yellowish tinge.

The spicules are of only one sort, oxeas from 2 by 104µ to 4 by 144µ, commonly only 3 by 120µ; these occur very abundantly throughout all the flesh as well as in the fibers.

Comparison to the rather similar *Haliclona subtriangularis* has been made in connection with the remarks given above in connection with that species.

Haliclona longleyi was described in Carnegie Institution of Washington Publication No. 435, 1932, page 54. The holotype, Cat. No. 22475, is deposited in the United States National Museum.

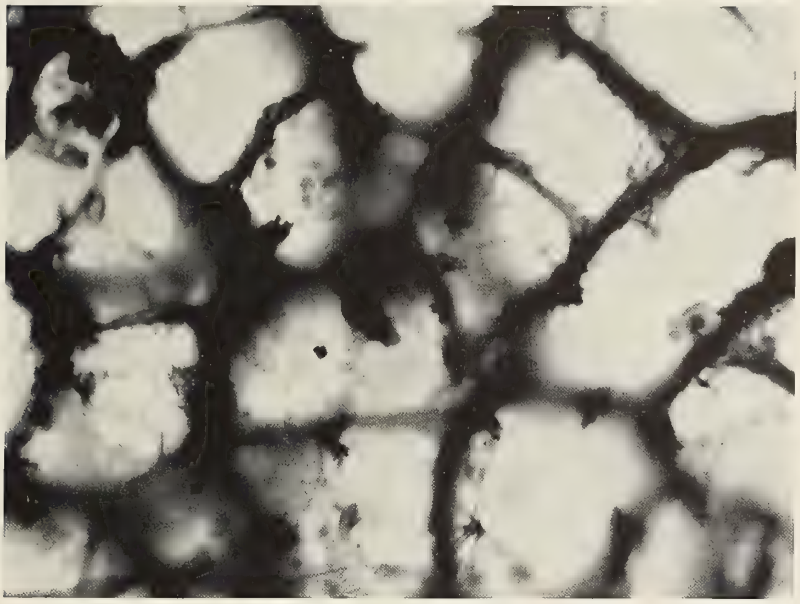


Fig. 1

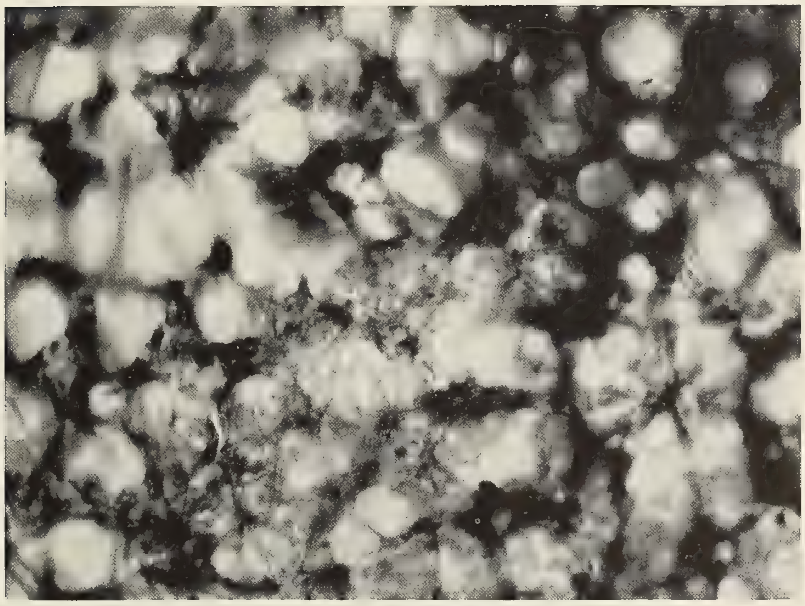


Fig. 2

Haliclona, photomicrographs of comparable sections of ectosome, x 80, slices cut tangential with surface. Figure 1, *H. rubens*. Note more open-work skeleton, protoplasmic sieves across meshes. Figure 2, *H. longleyi*. Note denser skeleton.

DASYCHALINA Ridley and Dendy

This genus is characterized by the very high conules or spinous processes protruding from the surface. These are ordinarily about 1 mm. in diameter and 4 or 5 mm. high. The skeleton consists of oxeas in tracts and in confusion in the flesh. In general the resemblance to the genus *Haliclona* is rather close and there is some proper skepticism as to the advisability of separating it from *Haliclona*.

Dasychalina cyathina new species

This specimen, the holotype, U. S. Nat. Mus. Cat. No. 22509, was found on the beach of Loggerhead Key, dry and reduced to a mere skeleton, in June 1932.

It is a vase, shaped like an inverted cone 4 by 9 cm. on top, less than 3 cm. in diameter at the now broken pedestal. At the thickest of all it is only 5 mm. and it comes to a paper-thin edge at the top. This rim is very much frilled with fibers or bunches of fibers which protrude 2 or 3 mm. and are about 2 mm. apart. The color of the skeleton is pale brown. The consistency is slightly spongy. The cloacal lining seems to have been nearly smooth, dotted with numerous oscules 2 to 4 mm. apart; they are represented now by holes 1.5 to 2.5 mm. in diameter. The outer surface is very shaggy with cone-shaped aggregations of fibers protruding like the skeletons of oil-well derricks in miniature, 2 mm. high and 2 to 4 mm. apart, in some cases nearly 5 mm. high. The mesh right at the dermis averages somewhat denser than in the endosome, but there is no sharp differentiation and no other ectosomal specialization is evident. The larger spongin fibers often are about 60µ in diameter, but some are at least as small as 40µ and others as large as 100µ. The meshes range from about 100 to 700µ in diameter and are often rectangular; the common size at the surface is 250µ and in the endosome 400µ. The fibers are evidently made chiefly of spongin but contain spicules from one side to the other, the thicker the fiber the more the number of rows. These spicules are oxeas usually 6µ in diameter with a range in length from 105 to 155µ; as is usual, however, there are a few thinner spicules down to 3 by 120µ or smaller.

This species is peculiar chiefly for the pronouncedly vase-like shape. It may have been one of the many described unrecognizably by Duchassaing and Michelotti and not represented by specimens at Turin. One may, for instance, hazard a guess that it was represented by their *Tuba longissima*, but this is mere surmise and not to be depended upon at all.

SCOPE OF THE FAMILY

In addition to the genera *Haliclona* and *Dasychalina* mentioned above, there are about a half dozen other genera of Haliclonidæ represented in the West Indies although not in the Dry Tortugas area. *Acervochalina* Ridley is very like *Haliclona*, and in fact may be a synonym of that genus; it is represented in the West Indian region by a species described as *Chalina finitima* by Schmidt (1870, p. 33); unlike typical *Haliclona* it is not ramose but is a mass with short spurs; its spicules are very small oxeas 2 by 100µ. It was transferred to *Acervochalina* by Ridley in 1864 (p. 399). The entire genus *Amphimédon* Duchassaing and Michelotti as originally described was for West Indian species only; of these the genotype *A. compressa* Duchassaing and Michelotti (1864, p. 78) represents a type of Haliclonidæ like *Haliclona* itself, except that its principal ascending tracts are perpendicular to and project notably from the surface. Other species of *Amphimédon* as described by Duchassaing and Michelotti go to other genera; for instance, *ferox* goes to *Hem-*

ectyon, *nolitangere* to *Fibulia*, *variabilis* to *Dysidea*, and *viridis*, as mentioned above, certainly to *Haliclona*. *Cacochalina* Schmidt is an unrecognizable genus; its genotype, *Cacochalina subtilis* Schmidt (1870, p. 33), and also *C. rubiginosa* Schmidt (1870, p. 33), are West Indian, but like the genus, unrecognizable. *Cribrochalina* Schmidt is also scarcely to be recognized; it was funnel-shaped, but what other characteristics it had we are not quite sure from Schmidt's data. Its genotype, *C. infundibulus* Schmidt (1870, p. 36), is West Indian as is *C. cretacea* Schmidt (1870, p. 36); the latter is even less easily to be recognized than is the genotype. *Foliolina* Schmidt is very strikingly featured by its peculiar external form which resembles somewhat a Chinese pagoda and is to be compared interestingly with *Stenospongia*; its genotype, *F. peltata* Schmidt (1870, p. 42), is a common species in the West Indies, if not right at the Dry Tortugas. *Siphonochalina* Schmidt has recently by Burton (1934, p. 535) been referred to *Adocia*, but the evidence given for such a transfer is rather unconvincing. It is even possible that this is a synonym of *Haliclona*, and yet again it may indeed be a valid genus for its very peculiar hollow habitus. Neither Burton nor Schmidt give definite indications in their descriptions of possession by sponges of this type of the special dermis characteristic of *Adocia*. Dendy (1890, p. 354) described *Siphonochalina spiculosa* from the West Indies, and on page 356 another species which he called *ceratosa*. Schmidt (1870, p. 34) described two species of *Siphonochalina* as *densa* and *mollis* from the West Indies, and in 1880 (p. 76) another which he called *viridescens*. All three of Schmidt's species are utterly unrecognizable.

In addition to *Haliclona*, *Dasychalina*, *Amphimédon*, *Foliolina* and *Siphonochalina* there are at least three other valid genera of Haliclonidæ. These include *Haliclonissa* Burton, of which the vertical fibers branch and anastomose in a peculiar fashion, and *Xestospongia* de Laubenfels in which the spicules are crowded together so that the reticulation is scarcely evident. Lastly there is a group for which the name of *Querciclona* is hereby proposed, to have as its genotype *Antherochalina quercifolia* Keller (1889, p. 338), and as another member *Arenochalina arabica* Keller (1889, p. 393); these two species may quite likely be conspecific. The habitus is remarkably lamellate with a shaft and marginal protrusions so that the resemblance is to cockscombs or oak leaves. In *arabica* and perhaps also in *quercifolia*, the ascending fibers contain more or less detritus in addition to oxeas. There seems to be nothing remarkable about the dermal structure, and as is true of all members of this family the relationship to *Haliclona* is very close. I do not believe, however, that it is maintaining unjustifiably fine distinctions to keep these eight genera distinct from each other and, furthermore, to do so is systematically convenient.

There are more generic names to be considered in connection with the Haliclonidæ that may represent valid genera, but for which at the present I do not have adequate data, and concerning which I seriously doubt that they are worthy of retention. One is *Chalinodendron* Lendenfeld. A second is *Dactylochalina* Lendenfeld, which may belong to the Callyspongiidæ, but concerning which one can only guess. A third is *Lessepsia* Keller, which may be congeneric with *Haliclona* but which may be instead one of the Desmacidonidæ. The last is that described by Levinsen as *Polysiphonia*, a name, however, which is preoccupied; in order to avoid confusion, therefore, I propose for it the nomen novum *Ysiphonia*. This may be congeneric with *Haliclona* or with *Siphonochalina*; it is impossible to be sure on the basis of the information that I have been able to acquire about it.

There are quite a few generic names concerning which we may be reasonably certain that they represent sponges that are in the family Haliclonidæ, but more than that can not be said, so that these genera are to be regarded as unrecognizable. These include the following: *Cavochalina* Carter; *Chalinorhaphis* Lendenfeld, of which the genotype should be established as *C. armata* Lendenfeld; *Diplodemia* Bowerbank; *Euchalina* Lendenfeld; of this Burton in 1934 (p. 540) designates as the type *E. rigida,* but according to the International Rules of Zoological Nomenclature this is impossible since Lendenfeld established one species with the name of *typica* (Lendenfeld, 1887, p. 817) ; this must therefore be taken as the "type by original designation" (Article 30. b.) ; *Euchalinopsis* Lendenfeld; *Pachychalina* Schmidt; *Pachychalinopsis* Schmidt; *Rayneria* Nardo, *Reniochalina* Lendenfeld; *Siphonochalinopsis* Schmidt.

The following names in the family Haliclonidæ have to be regarded as synonyms of *Haliclona; Chalina* Bowerbank; *Chalinula* Schmidt, the genotype is here established as *C. renieroides* Schmidt (1868, p. 7) ; *Philotia* Gray: *Phylosiphonia* Lendenfeld; *Veluspa* Miklucho Maclay; and *Reniera* Schmidt, of which it must be noted that the type is *R. aquæductus* Schmidt (1862, p. 72).

DESMACIDONIDÆ Gray

It has not been customary to include this family in the Haplosclerina, but its relationship seems to be exceedingly close to the fresh-water sponges and even to the genus *Haliclona.* Some sponges identified as of this latter genus are *Desmacidons* from which the microscleres have been lost. An example is *Haliclona* (*Pachychalina*) *excelsa* (Schmidt) which is probably established for specimens of the Desmacidonid sponge *Isodictya palmata* (Johnston) in which the chelas have not been found. (See Arndt, 1925, p. 89.) It would seem to be advisable to put these in at least the same order. The Desmacidonidæ are characterized by a very simple spiculation as far as the megascleres go; these are usually all of the same sort, and where there are differences the various sorts are not localized within the sponge but are indiscriminately strewn throughout the tissues. The microscleres, however, are typically quite complicated, one or more peculiar sorts usually being present. Were these to be missing there would be little distinction from the Haliclonidæ. We must note that it frequently happens to individual sponges, perhaps as a phase of their life history, that the microscleres are absent. When such a specimen is found it is frequently almost impossible to identify it with certainty. There is this assistance, that on the average the sponges of the family Desmacidonidæ have much more protoplasm and (colloidal) slime in proportion to their rigid skeletons than is true of Haliclonidæ. This is referred to below in connection with the perplexing genus *Liosina.*

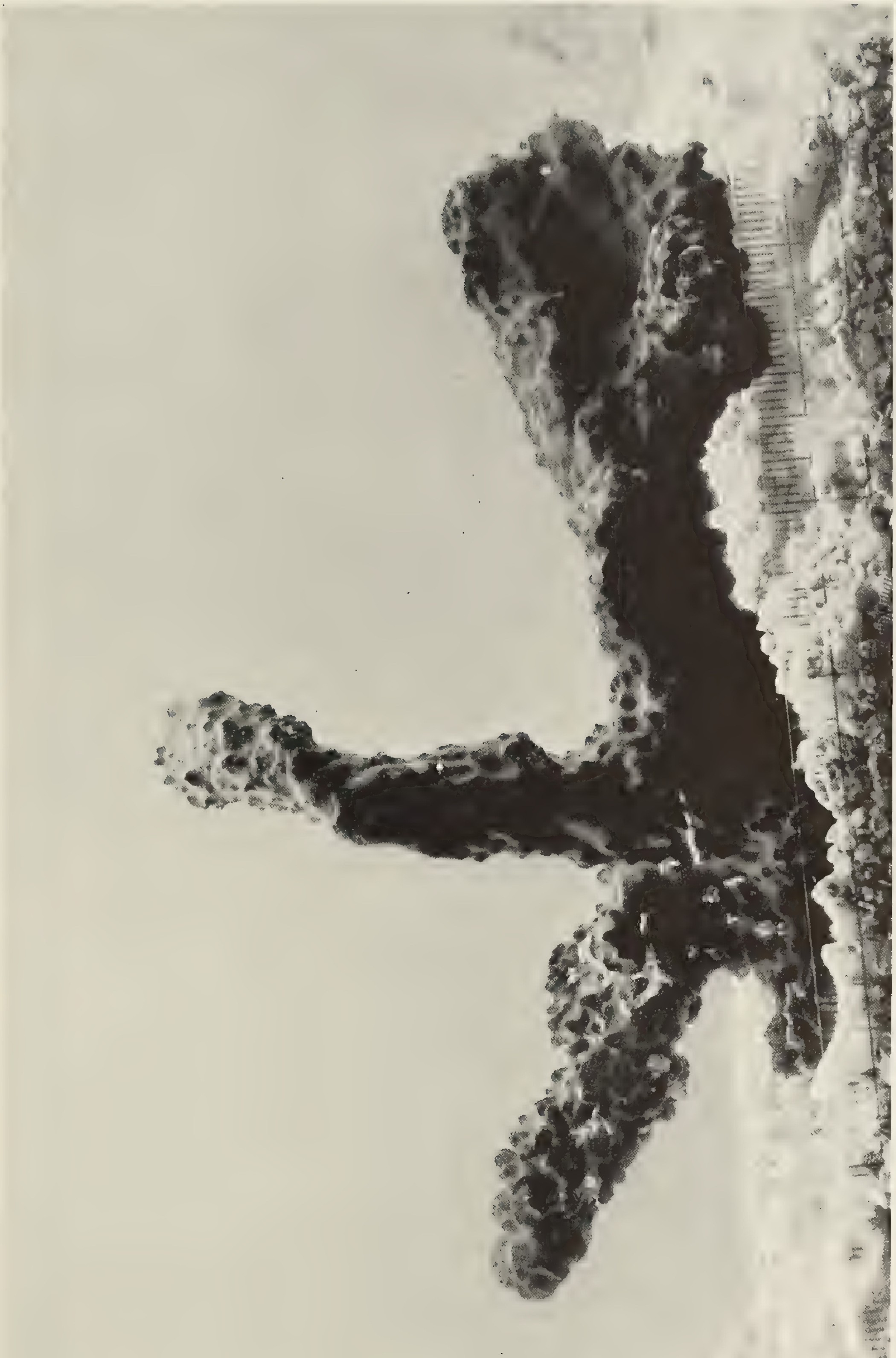
Of the families characterized by more than one sort of megascleres and those sorts localized in the sponge, the closest to the Desmacidonidæ is the Phorbasidæ. Some members of the family Cœlosphæridæ are very close in spiculation to the Desmacidonidæ but differ radically in that they have a peculiar body shape.

The question arises as to whether the Desmacidonidæ are perhaps polyphylectic, and such may be the case. We might, for instance, consider microsclere shape to be of primary importance and group together in one family all those sponges having birotulate microscleres, and in another family all those having diancistras. Ridley and Dendy in the above-mentioned classification of the *Challenger* Monaxonida appealed to microscleres for diagnoses of their very inclusive families. All the very many with chelas were in their Desmacidonidæ, those with no microscleres at all in their Hororrhaphidæ, and the rest of the reticulate spiculiferous genera in Heterorrhaphidæ. As mentioned elsewhere in this article, the present drift is away from such an emphasis—with just possibly some danger that by momentum we may be carried into undue disrespect for microscleres. Burton may go a trifle too far in his monograph of the *Sponges of the Great Barrier Reef* (1934) where he stresses the ease with which microscleres may be lost, but he certainly is not very far astray. Whereas every characteristic that is universal therefore loses taxonomic value, and hence all diagnostic features may be absent or present, microscleres are certainly more easily lost than most other items about a sponge. With any given type of microsclere we may find almost any size, shape, color, consistency, ectosome, endosome, or megasclere spiculation. My conclusion is that families should be based principally upon architecture and megascleres. The genera here assigned to the Desmacidonidæ differ widely as to microsclere content, but agree rather closely in other respects.

IOTROCHOTA Ridley

The most distinguishing feature of this genus is the presence of birotulates among the microscleres. These microscleres are very much like the corresponding spicules of fresh-water sponges, to which the Desmacidonidæ are evidently closely related. Their similarity to the amphidiscs of the Hyalospongiæ is significant of the genetic relationship existing between that class and the Demospongiæ. There may be two sorts or sizes of birotulates in species of *Iotrochota.* This offers interesting bases for comparison to *Iotaota* in the Tedaniidæ, in which latter genus birotules are found associated with unguiferate chelas. It seems very clear that this sort of chela, which is probably the most primitive of all, is merely an amphidisc in which the shaft that connects the two discs, instead of being straight, is bent. Loss of teeth, hence conversion into more or less smooth-edged plates, is found in the smooth-rimmed birotules of some fresh-water sponges (the genus *Trochospongilla*) and inequi-ended birotules corresponding to anisochelas are found in *Tubella* and other genera. In the species of *Iotrochota* to be described below the microscleres may easily be located within the living cells that manufacture them, each being contained inside the protoplasm of a single cell. Later the cell either dies and decays from the spicule or else abandons it. It is conspicuous that the straight shaft in such cells displaces the nucleus, pushing it unsymmetrically far out to one side. Were the nucleus more tenacious of its central location in the cell it would be necessary for the shaft to bend around it, resulting in a multidentate unguiferate chela.

Iotrochota is one of the few genera of the Desmacidonidæ to have any monactinal spicules whatsoever. *I. foveolaria* has chiefly styles for megascleres. This species has been regarded as the type of the genus because Vosmaer (1885, p. 352) characterized it as "example" of *Iotrochota.* This positively is not an establishment of a type, however, according to the rules of nomenclature. It is not a good "example" or type of the group, but an exception. The Dry Tortugas species, *birotulata,* would be much more representative, consequently it is here proposed definitely as the genotype. *I. foveolaria* was originally unrecognizably described as *Spongia f.* by Lamarck (1814, p. 457), but his specimens were capably redescribed by Topsent (1933, p. 13). Bowerbank (1875, p. 293) described as *Halichondria purpurea* at least some specimens of this sort, but to judge from material in the British Museum it is conceivable that he had more than one species among his materials. It was on the basis of Bowerbank's description that Ridley (1884, p. 433) established *Iotrochota* for the two above discussed species.



Iotrochota birotulata, still under water, scarcely disturbed at all, alive and healthy. Celluloid ruler photographed with specimen shows amount of enlargement. This specimen, like so many sponges of the vicinity of the Dry Tortugas, had attachment only to a bit of dead coral smaller than itself.

Iotrochota birotulata (Higgin) Ridley

Plate 9, fig. 1; Plate 17, fig. 1.

This species is common in a very limited area in the lagoon east of Bird Key, usually at depths of 2 to 5 meters. A specimen was dredged June 29, 1932, from a depth of 3 meters near Bird Key, and another specimen was dredged from a depth of 15 meters on June 25, 1932, from the same locality. These appear to be the extremes of the vertical range.

The shape is ramose to flabellate, the latter shape being attained by lateral conjunction of branches chiefly in one plane. The branches are 1 to 3 cm. in diameter and reach the height of at least 24 cm. There are usually more than half a dozen branches and, as indicated above, anastomoses between them occur. The specimen collected on August 3, 1932, from very shallow water was the largest that I have seen; it was 51 cm. high and had more than fifty branches. The color chiefly is a dark mahogany, a purplish brown, nearly black. There is a layer of cells, of a bright emerald green, over much of the surface. These often cover all but the tips of the conules. They are especially brilliant in a pattern like that of a map of a river system; this represents a series of subdermal canals where they are two layers thick. These canals lead to the oscules, just as a river system leads to its mouth. These canals are somewhat less than 1 mm. wide at the widest, and from that on down to microscopic thinness. The consistency is very spongy, tough, hard to cut or to break; in fact, this species has perhaps the greatest tensile strength of any sponge. Upon squeezing *Iotrochota birotulata* great masses of purplish slime are extruded. The surface of a healthy specimen under water has barely perceptible conules; very promptly upon removal from water, however, the dermis pulls away from the protruding fiber tips, and it and the subdermal canals flatten out so that these conules become very prominent. They are then over 1 mm. high and 2 to 4 mm. apart. Their distal extremities are usually bifid or even many-branched. Through the microscope the surface is smooth except for an occasional protruding spicule. The dermis proper is less than 20μ thick. The oscules are about 1 mm. in diameter in the adult. In very young specimens there is a high raised collar around each. I found such a collar only once in an adult. The oscules are rare; about one per 5 cm. of length of each cylindrical branch may be found. There are groups of pores 80 to 105μ in diameter, so closely spaced that the strands between them are only from 14 to 19μ wide, giving the appearance of a net over the dark background of the very extensive subdermal spaces, which are often nearly 200μ high. The bright green exhalent canals have been described above. The probably even more extensive inhalent canals often pass beneath them, in the form of sinus-like subdermal spaces rather than tubes; they are very dark walled and floored. The pore-sieves are in their ceilings and minute canals lead from their floors down into the endosome. The endosome is permeated by a fibro-reticulation of which the meshes are usually round. The fibers are so crooked that the pattern is rather vague, but in transverse sections it may be compared slightly to the pattern of a spider's web. The fibers range from 130 to 300μ in diameter and are densely packed with spicules. The meshes are 65 to 460μ in diameter. The flagellate chambers are closely grouped around canals of some 50μ diameter that lead ultimately to the bright green exhalent canal system and so to the oscules. Their apopyles are very short, so that the eurypyllous condition is approached; the prosopyles are very long. The chambers themselves vary in diameter from 25 to 40μ, 28μ being the common size.

The megascleres are chiefly strongyles, 3 by 153μ; fairly numerous styles 4 by 124μ also occur; the two sorts are mixed indiscriminately. Almost all the spicules are in the fibers, only a few loose in the flesh. In the soft parts of this sponge occur a very few microscleres; they are birotules 14μ in total length, 4μ in diameter of rotule. The total number of teeth or clads is difficult to make out because of the deceptive tendency to diffraction patterns. There is an indication of four-part symmetry, as in the corresponding spicules of the Hyalospongiæ. The number of clads is probably either 12 or 16.

The cytology and physiology of this species, which is exceptionally suited to laboratory experimentation, is discussed at length in de Laubenfels 1932 (Carnegie Inst. Wash. Pub. No. 435, p. 40ff.). In connection with such experimentation I made a careful study during three summers of well over a hundred specimens. The microscopical investigation was also supplemented by considerable study of many scores of specimens, alive, undisturbed, in their natural environment. The amount of variation between specimens is minute in the extreme. Younger ones are smaller than older ones. If the current is from varying directions the shape is ramose, but if guided by submarine valleys into a fairly constant direction the branches tend to grow in one plane which is at right angles to the current. Except for these factors each specimen is virtually a replica of every other one. This may indicate that when sponge specimens differ noticeably they should be considered different species rather than merely variant forms of the same one.

It was my privilege to study some of the Australian *Iotrochotas* in the British Museum; they all look very much like *birotulata*, agreeing rather extensively in external shape, surface structures and nature of the soft parts. To judge from the literature they differ significantly with regard to color and spicules as follows:

I. arbuscula Whitelegge (1906, p. 482) is grey, the megascleres almost entirely replaced by sand, the microscleres 20μ long.

I. baculifera Ridley (1884, p. 435) was crimson, has both strongyles and styles, the microscleres have only four clads at each end.

I. acerata Dendy (1896, p. 24) is perhaps the most like *birotulata*, but is more brownish in color, and has oxeas in addition to the styles and stronglyes; the microscleres are 12μ long.

I. (*Halichondria*) *purpurea* (Bowerbank, 1875, p. 293) had more of the purple tint in evidence, only styles, and larger (16μ) microscleres.

I. (*Axinella*) *coccinea* (Carter, 1886, p. 378) also was purple, rarely had strongyles, but its microscleres were extra small, in fact, only 7μ long.

Now is there but one Australian species, color from grey through brown and purple to red, with megascleres, various combinations of strongyles, styles and oxeas, microscleres with four or many clads at each end, varying from 7 to 20μ long?

The species with which I am familiar in life, as mentioned above, shows no variation in color except as there may be more or less area of green layer over the basic brownish purple. An individual specimen might be a different shade due to sickness or adhesion of foreign pigment, though I have not yet found any such, but even this would not account for crimson color, and furthermore the crimson species has tetraclad microscleres. *Birotulata* shows no appreciable variation in number of teeth to the birotules, especially not in the way of reduction to so small a number as four. It will be noted that the grey specimen has its amphidiscs regularly much larger than the size range for the others; its use of sand as a skeleton is scarcely even approached by the West Indian *Iotrochota*, although the latter grows in an environment of sand bottom, where numerous neighboring sponges appropriate foreign detritus generously for their skeletons. The two Australian purple species agree somewhat as to megasclers also, but one has exclusively extra large birotules, the other only extra small ones. Aside from a few which clearly seem to be juvenile forms, there is scarcely one micron variation in the lengths of the microscleres of *Iotrochota birotulata.*

Some sponge species do vary greatly as a result of environmental effects in one respect, others not so but instead in another respect. In general, I believe the amount of variation is much less than has been assumed. We should be on our guard against undue synonymization.

Higgin described this from Jamaica and Venezuela as *Halichondria birotulata* (1877, p. 296), and it was transferred to *Iotrochota* by Ridley (1884, p. 433). Whitfield (1901, p. 49) described this from the Bahamas as *Hircinia atra.*

FIBULIA Carter

The genotype of this group needs to be understood as being the West Indian sponge described by Carter (1882, p. 282) as *Fibularia massa* because it has been understood as being the type of *Fibularia* and because *Fibulia* is substituted directly for the earlier (preoccupied) name. The correct species name of the genotype is *nolitangere,* the sponge described below, as the two names are synonymous, and that of Duchassaing and Michelotti is earlier. The genus *Fibulia* is not at all typical of the Desmacidonidæ, but is strongly suggestive of the Adociidæ; it is characterized by a megasclere spiculation of simple diacts only, with sigmas and rhaphides as microscleres. The form is massive, somewhat reticulate, not nearly so fleshy as is usual among the Desmacidonidæ.

Fibulia nolitangere (Duchassaing and Michelotti) new combination

The two specimens of this sponge especially studied microscopically were dredged east of Loggerhead Key from a depth of 17 meters on June 23, 1932. It is very common in this locality, however, although often overlooked because so frequently nearly covered by loose coral sand. It grows almost invariably at the base of bushes of coral (*Acropora*) and gorgonians.

The specimens studied are irregularly massive growths about 4 to 11 cm. in diameter. One which was collected in 1928 was 10 by 20 by 26 cm. The surface is covered all over with lumps of sizes from submicroscopic up to 5 mm. high and 15 mm. in diameter, and there are some depressions of similar size range scattered among them. The oscules or cloacas are frequently situated on the apices of such protuberances, so the species sometimes resembles a village of African huts, each a round dome 5 to 8 cm. in diameter with a large chimney hole 11 to 27 mm. in diameter opening from the center of the roof. The color was mainly drab when collected and is entirely drab-gray upon preservation in alcohol, but in life there were regions here and there of mahogany brown shading off into the paler color at the edges. These almost certainly represent places where the overlying sand did not quite cover the surface, therefore permitting the sunlight to reach the outermost cells. Occasionally almost the entire ectosome is mahogany brown. The consistency is very soft, tearing under its own weight when lifted out of water. The sponge is compressible, not brittle. The surface is minutely tuberculate, as mentioned above, and there is a slight specialization, in that the structures there are very much denser than they are within. This ectosome is not easily separable, but may be sliced off. The surface is dotted with numerous openings of all sizes up to 2 mm. in diameter; the larger ones are undoubtedly oscules, but where to draw the line between them and the pores is a difficult problem. There are certainly very numerous dermal openings about 65 to 80μ across, which are probably inhalent. The endosome is rather "crumb of bread" in appearance, permeated by fibers about 70μ in diameter, that branch and anastomose irregularly. The meshes are not readily measured, because of their great irregularity. One might say they were in the neighborhood of 100 to 200μ across. The fibers are little more than densely packed serial rows of parallel spicules. The spongin present (if any) is very inconspicuous. These spicules also occur loose in the flesh. They are strongyles about 4.5 by 335μ, very few are larger, many are smaller, the latter variety may possibly represent developmental forms. The microscleres are rhaphides, 0.4 by 80μ.

One of the most remarkable things about this sponge is its effect on the human flesh. Wherever one touches it, with fingers or any other exposed skin, within an hour afterward a swelling appears which smarts and stings painfully. Some men with hands much calloused, and hence very tough, did not have the trouble, but I did most emphatically. I tried various chemicals to obtain relief from this, among others using many with basic reactions and these intensified rather than relieved the difficulty. Then I tried the opposite and discovered that almost anything with an acid reaction helped somewhat; dilute acetic acid was the most soothing of any tried. It is conceivable that spicules are to blame, but since the spiculation does not differ radically from other sponges that do not have any such irritating effect, and since the chemical effect noted above was evident with regard to the problem of obtaining relief, one is led to the belief that the irritation may be of a chemical nature.

This species was originally described as *Amphimédon nolitangere* by Duchassaing and Michelotti (1864, p. 82). Both in the name they assigned to this species and in their original description, the authors make it clear that they had very much the same difficulty upon touching the sponge that I had. To bear out my contention above, that it is of chemical origin, one may add further the comment that it appears too quickly to be caused mechanically by spicules working their way into the flesh. Irritations of this sort are not common among sponges. It is true that collectors of commercial sponges frequently complain of irritations to their hands, but these may be obtained accidentally by touching cœlenterates that occurred adjacent to the sponges (and which were well provided with nematocysts) or from other marine invertebrates.

Scope of the Family

Among the interesting West Indian sponges belonging to the family Desmacidonidæ, but not occurring at the Dry Tortugas, we find that described by Carter (1882, p. 297) as *Hymedesmia schmidti.* This is not a *Hymedesmia,* however, but requires the establishment of a new genus, which I propose with the name of *Athnacama,* and as genotype, not *schmidti* of Carter, but instead *Hamacantha lundbecki* Topsent (1904, p. 220). I select this because it is better described than Carter's species. This genus is characterized by only oxeas as megascleres, the microscleres being diancistras and sigmas. Another group comprising many West Indian sponges for which a new generic name seems advisable is that for which I select as genotype *Desmacidon australis* Dendy (1896, p. 19), and which I propose to call *Burtonispongia* in respect to the eminent zoologist M. Burton of the British Museum. In this connection interesting comparisons can be made to *Anomodoryx* and *Psammodoryx.* The spiculation is of strongyles as megascleres, tridenate (arcuate ?) chelas and sigmas for microscleres, the chief difference from *Desmacidon* proper being in the form of the megascleres. West Indian species belonging to this new genus include *Desmacidon tunicata* Schmidt (1870, p. 55), *Desmacidon dianæ* Schmidt (1870, p. 55), and *Fibularia raphidifera* Topsent (1889, p. 16). Among others, not West Indian, but which by their descriptions would seem to belong in this new genus, may be mentioned *Halichondria cylindracea* Bowerbank (1882, p. 96), *Desmacidon griseum* Schmidt (1870, p. 55)—although this is scarcely recognizable—*Desmacidon peltatus* Topsent (1904, p. 204), *Desmacidon platei* Thiele (1905, p. 436), *Halichondria stelliderma* Carter (1886, p. 451), and perhaps *Dysidea chaliniformis* Carter (1885, p. 217). Priest (1881, p. 302) described from Honduras a sponge as *Polymastia biclavata.* This is not a *Polymastia,* but should be transferred to the genus *Cornulella* Dendy, a typical member of the family Desmacidonidæ. *Cornulella* has tylotes as megascleres, some of them are slightly spined at the ends; its microscleres are peculiar isochelas, toxas, and microrhabds. *Desmacidon* Bowerbank has only oxeas for megascleres, sigmas and isochelas (entirely or almost anchorate) for microscleres. It is represented from the West Indies by *D. carteriana* Arndt (1928, p. 147). The type of the genus is the European *Spongia fruticosa* Montagu (1818, p. 112) which gives off really enormous amounts of slime upon being handled. Two West Indian sponges probably belonging to the genus *Gelliodes* of the family Desmacidonidæ are those described as *Fibularia ramosa* Carter (1882, p. 283) and as *Gellius perforatus* Wilson (1904, p. 150). *Gelliodes* Ridley, which has only oxeas and sigmas for spicules, is very much like a *Desmacidon* without chelas, having the typical soft flesh and more or less conulose surface with distinct fleshy dermis. Its genotype should be established as *Axos fibulata* Carter (1881, p. 383). From their descriptions it would appear that the following species should be transferred into the genus *Gelliodes: Desmacidon stelligera* Whitelegge (1906, p. 477) and *Desmacidon hispidosa* Whitelegge (1906, p. 476). *Gelliodes benedeni* Topsent (1901, p. 2), which appears to be conspecific with the sponge described as *Microxina charcoti* Topsent (1916, p. 170) has been regarded as a *Gellius,* but should remain in *Gelliodes.* Another about which I feel very dubious is *Gellius tubuloramosus* Dendy (1924, p. 323); it answers to the diagnosis of a *Gelliodes,* but its apparent resemblance to *Gellius calyx* Ridley and Dendy (1896, p. 334) is puzzling; perhaps they are not really genetically close, but merely resemble each other superficially. Yet another *Gelliodes* is worthy of mention, it being West Indian, this is *G. leucosolenia* de Laubenfels (1932, p. 22).

Apparently valid genera of the family Desmacidonidæ which do not seem to be represented by species in the West Indies comprise the following. *Anomordoryx* Burton differs from *Burtonispongia* chiefly in the form of the chelas, which in *Anomordoryx* are unguiferate, instead of arcuate or anchorate. *Barbosia* Dendy has palmate anisochelas, sigmas, and what are dubiously to be interpreted as discorhabds. *Cercidochela* Kirkpatrick has cercidochelas. *Collosclerophora* Dendy has microscopic bean-shaped bits of colloidal silica which may represent modified chelas. *Cornulum* Carter has palmate isochelas and toxas. *Dendoricella* Lundbeck, of which the genotype should be established as *Dendoricella rhopalium* Lundbeck (1905, p. 127), has odd spiny palmate isochelas. *Damiriopsis* Burton has the rare combination of anchorate and palmate isochelas. *Guitarra* Carter has very peculiar microscleres (placochelas). *Hamigera* Gray has microscleres that are anchorate isochelas and as in *Barbosia* there are special pore areas. Two species originally assigned to this genus really should be transferred to *Lissodendoryx*; they are *ternatensis* Thiele (1903, p. 952) and *stipitata* Arnesen (1903, p. 20). *Hemitedania* Hallmann has microrhabds; this should be compared carefully to *Desmoxya* and *Tedanione. Hoplakithara* Kirkpatrick has placochelas, sigmas and some of the megascleres are exotylote. *Isodictya* Bowerbank has palmate isochelas. *Liosina* Thiele lacks microscleres, but has a fleshy structure more like that of *Desmascidon* than like *Haliclona*; it should receive *Plumocolumella cribriporosa* Burton (1930, p. 425). *Microtylotella* Dendy should be compared to *Cornulella* and *Cornulum*; it has (arculate ?) isochelas, toxas, and microscleres shaped like tylotes. *Oxymycale* Hentschel has rosettes of palmate anisochelas. *Plumocolumella* Burton is a very interesting genus, concerning which further data might be desired. There is some possibility, for instance, that it is a synonym of *Fibulia*, but its description of oxeas and sigmas sounds as though it might fall to *Gelliodes*. I will hazard the opinion that were we provided with adequate information, it would be found not to be congeneric with either of these, but instead with a group which I am here giving the name of *Plumocolumetta* as a new genus. Species which have been referred to *Plumocolumella*, but which should be returned to their original generic location in *Desmacidon*, include *arenosa* Whitelegge (1906, p. 478) and *ramosa* Ridley and Dendy (1886, p. 346). *Plumocolumetta*, here described as a new genus, may not really be new, although on paper it appears that such is the case. I take as genotype *Gellius bidens* Topsent (1901, p. 14). This would require that the genus should be diagnosed as having oxeas for megascleres and sigmas for microscleres, some of which sigmas are characterized by having a bifurcation at each end. The species is spongy and has a hispid surface. *Protophlitaspongia* Burton is admittedly very hard to allocate, but its hastate diactinal megascleres look very much to me like those of *Guitarra*; it has no microscleres, nevertheless I hazard the guess that it belongs here in the Desmacidonidæ but is not a synonym of *Liosina*. *Sigmaxinyssa* Kirkpatrick should receive *Gelliodes plexa* Lundbeck (1902, p. 75). *Strongylacidon* Lendenfeld has (anchorate?) anisochelas. *Tedanione* Wilson has as microscleres only smooth rhaphides. Finally *Tedaniopsis* Dendy, which receives *Tedania bispinata* Hentschel (1911, p. 335), has microtylostyles.

Two generic names representing sponges which are quite probably in the family Desmacidonidæ but are otherwise unrecognizable comprise *Ingallia* Gray and *Pharetronema* Sollas.

A group of generic names representing sponges that are probably synonymous with other genera comprises the following. *Fibularia* Carter should have *Fibularia massa* Carter (1882, p. 282) definitely established as its genotype. This is not only a synonym of the above discussed genus *Fibulia*, but of the above described species *nolitangere* from the Dry Tortugas. *Homœodictya* Ehlers is a synonym of *Isodictya*. *Microxina* Topsent is a synonym of *Gelliodes*. *Migas* Sollas should be dropped in synonymy to *Liosina*. *Platychalina* Ehlers is a synonym of *Isodictya*, as is also probably *Textiliforma* Carter.

There are still some described species of sponge obviously belonging to the family Desmacidonidæ, for which allocation in any of the hitherto described genera seems difficult and I therefore suggest new generic names for them as follows. *Xytopsaga* is established for genotype *Plumocolumella myxillioides* Burton (1932, p. 288). This genus is characterized by having hastate diactines for megascleres and arcuate chelas for miscrocleres. *Xytopsene* is established for genotype *Suberites fistulatus* Carter (1880, p. 53). This genus is characterized by having tylotes sometimes with slightly spined ends as megascleres, and palmate chelas as microscleres; it is a subradiate mass with fistules. It should receive *Cornulum novæzealandiæ* Brøndsted (1924, p. 473) and *Cornulum strepsichela* Dendy (1921, p. 105). *Xytopsihis* is established for genotype *Halichondria aspera* Bowerbank (1875). This species is not very well known, but seems to have had both oxeas and strongyles for megascleres, and chelas of two sizes. *Halichondria aspera* of Swarchevsky (1906, p. 323) is not conspecific with that of Bowerbank and therefore a new name is needed for it. Therefore I propose that it be called *Halichondria lona* nomen novum. *Xytopsoöcha* is established for genotype *Gellius macrosigma* Topsent (1890, p. 65). This has tylote megascleres, enormous sigmas, medium sized sigmas and rhaphides as microscleres. *Xytopsues* is hereby proposed for genotype *Phoriospongia osburnensis* George and Wilson (1919, p. 154). This has strongyles as megascleres, arcuate chelas, and sigmas for microscleres, and is rather close to *Psammochela*, in that there is considerable sand present in the sponge. I have frequently found sponges that seem to show characteristics of more than one family, perhaps indicating relationships; these are bridges over gaps as it were. This last species might possibly even be cited as a reason for including the family Psammascidæ (see below) in with the Desmacidonidæ.

CALLYSPONGIIDÆ new family

The sponges of this family differ from those in the Haliclonidæ in that between the meshes of the comparatively coarse reticulation at the surface there is a secondary reticulation of smaller fibers making smaller meshes. The coarser reticulation extends throughout the sponge and in it and in the finer one also, the meshes are regular, often rectangular and practically always straight-sided (*i.e.* polygonal). They always have abundant spongin—only a few Haliclonids equal them in this respect. The megascleres are always simple, occasionally rare or wanting, minute oxeas being the rule. A few simple microscleres, such as toxas, may be present.

The very item whereby this family is set apart from the Haliclonidæ is suggestive of the ensuing order, the Pœcilosclerina, and not typical of the Haplosclerina. It is left in the latter order, however, because the spicules are not at all peculiar at the surface or in any other restricted locality, as compared to the situation throughout the sponge body. There is a dermal specialization, but only one of organic material, a fiber pattern.

Macerated Callyspongids bear a superficial resemblance to similarly de-fleshed specimens of *Spongia* in respect to the gross appearance of the fiber. With the microscope the former are usually seen to have spicules, but in the occasional instance when they are wanting the resemblance to commercial sponge fiber is considerable. In life, with the soft parts present, *Spongia* has a cuticle and much flesh, but the Callyspongiidæ have no cuticle and relatively far less flesh. In fact, the protoplasmic structures may be dispersed quite scantily about the skeleton in the latter family.

Specimens of both the principal genera of Callyspongiidæ are common in the West Indian region.

CALLYSPONGIA Duchassaing and Michelotti

This genus has the characteristics of the family as mentioned above, with the proviso that the spiculation consists exclusively of small oxeas. The surface is frequently thrown into relatively sharp conules which may, however, be completely absent from larger or smaller portions of the sponge colony. Sponges referable to this genus are exceedingly abundant in the vicinity of the Dry Tortugas, but all except one such specimen seem to be referable to the one species *vaginalis*. The one in question is here to be described as a new species *arcesiosa*. Further discussion of this genus is given below in connection with the discussion bearing upon the genus *Patuloscula*.

Callyspongia arcesiosa new species

This species was found growing on *Sargassum* seaweed floating on the edge of the Gulf Stream. The holotype, U. S. Nat. Mus. Cat. No. 22525, was taken on July 24, 1927.

It is a ramose form with two thin digitate branches, each some 5 mm. diameter. The total height is about 12 cm. The color in life was a lovely greenish blue. The consistency is delicately spongy, easily torn and cut. The surface is almost smooth, but there is some tendency for the ascending fibers of the body to protrude from the surface. There is no separable dermis, but the ectodermal specialization is chiefly a fibro-reticulation. This, as is characteristic of the genus, is double. The coarser net is of fibers 15μ thick, making polygonal meshes 70 to 80μ in diameter. These are in turn closed in by the secondary reticulation of fibers 6μ in diameter, making polygonal meshes 30 to 40μ in diameter. The endosomal reticulation is rather regular, the fibers very often meeting at right angles as is characteristic of this genus. The fibers contain a core of one to seven rows of spicules, usually four, and are about 15μ in diameter. The meshes are often in the neighborhood of 100μ across, but in some places are much smaller. The spicules are minute oxeas, 0.5 by 35μ to 1.5 by 95μ, very often about 60μ long, and slightly under 1μ thick.

This species is set off sharply from all others of the genus by the exceedingly delicate structure, the small scale upon which all the architecture is based. The color also is quite distinctive. There exists some possibility, to judge only from the very indifferent illustrations rendered, that this is the species described as *Arcesios prominula* by Duchassaing and Michelotti (1864, p. 96). The descriptions of these authors are so unreliable, however, that since no specimen of this is preserved, the synonymy can not be established. It is to be noted that where specimens were preserved at Turin I frequently found them entirely different from that which would have been anticipated, in each case, from a study of their illustrations.

Callyspongia vaginalis (Lamarck) new combination

Plate 14, fig. 1.

This species is rather common in the vicinity of the Dry Tortugas. In the dredging operations of 1932 it was collected only some three or four times, which is not a very impressive showing in comparison to numerous other species, but in the wrack thrown up on the beach after hard storms, this form is so very abundant that it must be common in some localities and these must be particularly affected by storms, as there seems to be no indication that the species is detached from the bottom more easily than are other sponges. The typical form is a group of hollow cylinders, but rather frequently specimens are found that are partly or entirely solid. There are usually six or more tubes per colony, having walls about 4 or 5 mm. thick, the total diameter of the tube being about 4 cm. with a maximum variation between say, 2 to 6 cm. The height extends up to at least 20 cm. and perhaps in some cases to more. There is evidence that ecological factors may change during the growth of the sponge. For example, one large specimen was collected on each of the tubes of which conules had formed for a while during growth, and then at apparently the same time all the tubes began to elongate with the surface now remaining smooth. Still later, apparently again simultaneously, all the different tubes began to make conules as they grew. The color in life is a bright lavender, rarely (one specimen) being rather pinkish. The consistency is very spongy. As mentioned above there are conules; these are usually relatively very acute and say 3 to 5 mm. high, and of a similar

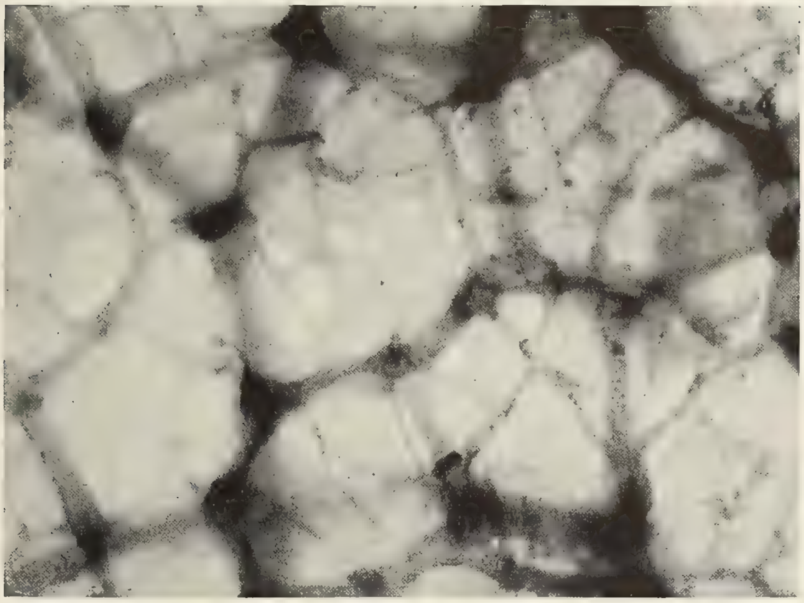


Fig. 1

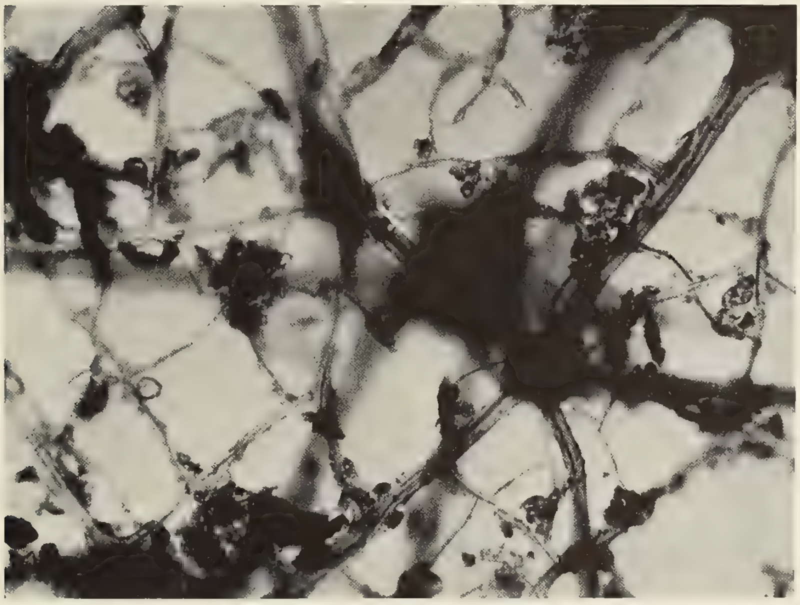


Fig. 2

Patuloscula plicifera. Photomicrographs of sections, x 80. Figure 1, tangential slice of surface. Note network of coarser fibers, in its meshes networks of finer fibers, and within their meshes perforated sheets of protoplasm. Figure 2, section of endosome. Note scantily dispersed protoplasmic structures as typical of the family Callyspongiidæ.

diameter at their expanded bases. Larger or smaller patches on the surface, however, are quite smooth. With a microscope it is noticed that often spicules protrude from the dermal fibers, each encased in a small amount of spongin, making minute conules 20μ in diameter, 40 to 70μ high. The cloacal surface is of finer mesh than is the outer one, and frequently contains much very fine detritus. In at least one specimen of this sponge were found embryos, oval, about 200 by 240μ. The coarser dermal fibers vary from 30 to 70μ in diameter and make a mesh with apertures 130 to 400μ in diameter. The finer dermal mesh consists of fibers 7 to 20μ in diameter and makes a reticulum with meshes 60 to 100μ in diameter. The coarser endosomal fibers vary from 10 to 100μ in diameter and make a network, frequently rectangular, with meshes 100 to 400μ across. The spicules seem always to be oxeas, and typical measurements for them are 2 by 35μ, 3 by 50μ, 4 by 70μ. Some of the smaller ones occasionally seem to be slightly bent but always under circumstances that might be interpreted as accidental. I seriously doubt that there are ever any proper toxiform spicules present.

This species was first described as *Spongia vaginalis* Lamarck (1818, p. 436). Topsent has excellently redescribed Lamarck's material (1932, p. 75), and I have studied the original specimens in Paris myself. This is the species very commonly referred to in West Indian collections as *Spinosella sororia.* This refers to the species described by Duchassaing and Michelotti (1864, p. 46) as *Tuba sororia,* the genotype of *Tuba,* and also the genotype of *Spinosella,* which as shown by Burton (1934, p. 500) falls in synonymy to *Callyspongia.* The third genus which also falls in synonomy here is *Cladochalina.* For comparisons to the very abundant Dry Tortugas species, *Patuloscula plicifera,* which is superficially very like *vaginalis,* note the remarks made under the heading of *Patuloscula* below. All the various species described as *Callyspongia* and *Tuba* by Duchassaing and Michelotti are West Indian forms, but many are synonyms of one another.

PATULOSCULA Carter

This genus was originally separated for its external form, but this is unreliable, inasmuch as very similar external shapes are assumed by the neighboring genus *Callyspongia.* A better basis of separation may possibly be the possession in *Patuloscula* of peculiar toxiform spicules. These do not resemble closely the toxas of other sponges, but seem to be more or less accidental bendings of the smaller spicules. It seems to me very probable that they represent merely a pecularity that occurs in the growth forms of the ordinary oxeas of this genus.

Patuloscula plicifera (Lamarck) new combination

Plate 10.

This species is fairly common in the vicinity of the Dry Tortugas, but judging from those that I have studied carefully enough for identification, somewhat less than half so common as *Callyspongia vaginalis.* In comparison to that species it is not quite so often hollow, *i.e.* is slightly more often solid and branched, or ramose. In the hollow forms the wall is usually about 1 cm. thick, total tube diameter about 5 by 9 cm. and the height reaches at least 23 cm. As in *vaginalis,* the color is usually lavender in life, but averages considerably duller, less pink than is true of vaginalis. The consistency is similarly spongy. The surface structure on the average is quite different, though in places, here and there, there are similarities; *plicifera* is typically covered with low domes, which may be prolonged into ridges and even become gyriform. In the latter case the valleys and ridges are each about 3 mm. high and wide, respectively. There are seldom sharp conules and also very seldom really smooth or level places on the surface. In the solid digitate forms, the oscules often have collars raised about them 1 mm. or more, which is not common in the case of the solid forms of *vaginalis*. The coarser dermal fibers of *plicifera* are 50 to 100μ instead of only 30 to 70μ, and enclose meshes 400 to 1000μ, instead of 130 to 400μ as in *vaginalis*. The finer dermal fibers are 10 to 30μ instead of 7 to 20μ, and enclose meshes from 100 to 300μ, instead of from 60 to 100μ. The endosomal fibers are from 50 to 150μ, instead of 10 to 100μ, and enclose meshes from 150 to 600μ, instead of from 100 to 400μ. The spicules are notably longer and thinner proportioned than those of *vaginalis,* and are very frequently, though not always, modified to the shape of strongyles; typical sizes for them may be given as 1 by 60μ, 1.5 by 75μ, 3 by 90μ. In addition to these megascleres there are more or less abundant pseudotoxas present. In other words the smaller spicules, apparently otherwise like the larger oxeas, are frequently bent once. This may represent some accident in growth, to which this species is especially liable, as the number so bent varies greatly. In some specimens very few of the smaller spicules are curved, almost all being straight, in other specimens most of the smaller spicules are curved, very few being straight. It is by no means rare in sponges in general for some of the younger spicules to be slightly curved, but the exceptional frequence with which this modification appears in the genus *Patuloscula* seems to be significant.

Patuloscula plicifera and *Callyspongia vaginalis* superficially resemble each other a great deal. Confronted with a series of specimens representing both of these species, I was tempted to regard them all as conspecific, namely *Callyspongi vaginalis,* but then, as I studied first one and then another, it began to seem that there were three or four species represented. I approached the problem by tabulating carefully all the above items, and endeavored to ascertain which variations were associated with each other, and which were, as one might say, independent variations. It appeared that hollow versus solid form could not be used as a basis of differentiation, because it was not uniformly associated with other characteristics. Then it was noticed that the pseudotoxas and strongyles, while not always present, when they did occur were associated with each other and with coarser fibers and coarser mesh and with the lack of sharp conules on the surface. We may say with considerable confidence that at Tortugas there are two types of sponge, in general much resembling each other, the one having level areas among acute conules and having only oxeas as spicules; the other having obtusely tuberculate surface, coarser mesh, the megascleres frequently strongyles, and the smaller spicules modified to be pseudotoxas. Although clearly closely related to each other, I recommend that they be kept in separate genera for the present.

This species was first described as *Spongia plicifera* by Lamarck (1814, p. 435). This specimen was well redescribed by Topsent (1932, p. 73), and in 1928 I studied the original in Europe. It seems to have been correctly identified as to species by Schmidt (1870, p. 28) and by Dendy (1890, p. 363), perhaps also by Carter (1882, p. 365). It would appear that *Patuloscula procumbens* Carter (1882, p. 365), the type of that genus, would also fall in synonymy here. That was also a West Indian form. Perhaps *Ceraochalina vanderhorsti* Arndt (1928, p. 154) may be another synonym of *plicifera.*

Scope of the Family

Euplacella Lendenfeld as redescribed by Burton (1934) seems to be like *Callyspongia,* except for possession at the nodes of the dermis of erect spicule brushes. In view of the sporadic tendency of all Callyspongias to have more or less spicules protruding here and there on the surface, this is of only dubious value. The genotype of *Euplacella* should be taken as *E. mollissima* Lendenfeld (1887, p. 790). *Velinea* Vosmaer is separated for the total lack of any spicules whatever. It will be noted that according to paper definition it would seem to be closely related to, if not actually a member of, the family Spongiidæ. As a matter of fact this genus is exceedingly close to *Callyspongia,* and perhaps should not be separated from it at all, except, as mentioned in several places above, for reasons of convenience. There is one, but apparently only one, genus that is genuinely intermediate between Callyspongiidæ and the Adociidæ. This is *Tubulodigitus* Carter, as redescribed by Burton (1934, p. 536). In the location cited, Burton ascribes it to the genus *Adocia,* but the Callyspongid tendencies are so pronounced that it would seem to be decidedly worthy of separate generic rank.

On the basis of published descriptions, I should put the genus *Dactylia* Carter in the family Callyspongiidæ. This, like *Velinea,* is one of the sponges lacking proper spicules, nevertheless regarded by those familiar with it as not belonging to the order Keratosa, but to one of the orders properly having spicules. The type of this genus needs to be established as *Dactylia chaliniformis* Carter (1885, p. 309). Still basing the decision on published material, subject to possible emendation by some workers possessed of original material that is well preserved and available for careful comparison, I should drop into synonomy with *Dactylia* the following four genera; *Chalinopsilla* Lendenfeld, *Chalinopsis* Lendenfeld, *Paraspongia* Carter and *Psammoclema* Marshall.

There are four genera insufficiently characterized that apparently belong to the Callyspongiidæ, but are not well enough known that they may be used when identifying specimens. The first is *Arcesios* Duchassaing and Michelotti, of which the genotype is here established as *A. prominula* Duchassaing and Michelotti (1864, p. 96), a West Indian genus entirely. The second and third are *Ceraochalina* Lendenfeld and *Chalinella* Lendenfeld, of which latter the genotype needs to be established as *Chalinella macropora* Lendenfeld (1887). *Fistula* Oken was described very early, that is to say 1814 (p. 79), and included *Spongia velosa* which has been referred to *Callyspongia* by Topsent (1932, p. 67). If this were taken as the type of the genus *Fistula,* then *Callyspongia* would fall in synonomy to Oken's genus. In order to forestall this rather regrettable contingency, I hereby establish as the genotype of *Fistula, Spongia fulva* Pallas (1766, p. 382) which is an essentially unrecognizable species. *Pseudochalina* Schmidt and *Sclerochalina* Schmidt are both unrecognizable. Of the latter, *Sclerochalina cyathis* Schmidt (1870, p. 35) was a West Indian species. *Siphonella* Lendenfeld, also unrecognizable, needs to have established as its genotype *Siphonella communis* Lendenfeld (1887, p. 809).

The following genera of Callyspongiidæ are synonyms of others: *Cladochalina* Schmidt falls to *Callyspongia*; its type *armigera* is a West Indian species. *Placochalina* Lendenfeld falls in synonomy to *Euplacella*; its genotype needs to be established as *Cavochalina bilamellata* Carter (1885, p. 287), which may or may not equal *Spongia bilamellata* of Lamarck. *Spinosella* Vosmaer, genotype *Tuba sororia* Duchassaing and Michelotti (1864, p. 46), is a synonym of *Callyspongia,* the type mentioned being a West Indian sponge. *Toxochalina* Ridley falls in synonymy to *Patuloscula*; its genotype needs to be established as *Desmacidon foliodes*; Bowerbank (1875, p. 295). Finally *Tuba* Duchassaing and Michelotti also falls to *Callyspongia* in synonymy.

OSCARELLIDÆ Lendenfeld

This family has been established for the single genus *Oscarella,* which has absolutely no hard skeleton at all, not even any fibers. Lacking any rigidity, its species never grow very thick, but remain just thin encrustations of protoplasm. Where should this family be classified? Michin (1900, p. 146) included it with the one other family, the Halisarcidæ, in his "grade" or order Myxospongida. Subsequent authors have felt that the round diplodal flagellate chambers of *Oscarella* separated it significantly from sponges which like *Halisarca* have long eurypyllous ones. Hentschel (1923, p. 375) and Topsent (1928, p. 32) put it in the order Homosclerophora, here called *Carnosa.* This indicates a belief as to its genetic relationship with the Chondrosiidæ and thus to the Chondrillidæ and Halinidæ. On the other hand, Dendy and Row (1913, p. 738), discussing the Calcispongiæ, particularly the genus *Leucettusa* find large portions of *L. hæckeliana* that lack spicules and are indistinguishable from *Oscarella.* It is highly improbable that this latter genus represents any sponge of the Hyalospongiæ that has lost its spicules, which hypothesis might conceivably be true of the genus *Halisarca.* Any one of numerous genera of the other classes of Porifera, however, might by loss of skeleton be identified as *Oscarella.* Perhaps the various specimens, found in different regions of the world, have had independent origins (polyphyletic) from various families. It is not here maintained that the Oscarellidæ bear any more nor any less relationship to the Haplosclerina than to sponges in other orders. The family is merely left here for want of any more satisfactory location and to call attention to the extent of our ignorance of its phylogeny.

Oscarella has as a synonym the preoccupied name *Oscaria* and I do not find in the literature any recorded occurrences of the genus in the West Indies.

PŒCILOSCLERINA Topsent

This order has been established for sponges that differ from those in the Haplosclerina by having two or more categories of megasclere, each confined to a particular part of the sponge. As in the Haplosclerina there regularly are present spicules aggregated into reticulations by more or less spongin. There may be very conspicuous fibers of spongin. In exceptional cases the reticulate structure is wanting, but then it is normally replaced by confusion rather than by radiate or plumose architecture. The principal spicules are usually regarded as being those that make up the fibrous or main skeleton, as do those of the Haplosclerina. The sponges of the Pœcilosclerina have at least one other category of what may be termed auxiliary spicules. At the simplest this is a lot of megascleres, recognizably different from those in the fibers or tracts, and found not there but instead loose in the flesh. As a rule this auxiliary kind extends very especially up to the surface, and at times it is confined to the immediate vicinity of the surface. In this case, it is spoken of as a dermal spicule sort. Dermal spicules may be tangentally placed, in confusion, or standing erect, perpendicular to the surface. Burton, 1931 (Proc. Zool. Soc. London, p. 524), concludes that the tangental arrangement is primitive and that a species may when young have its dermal spicules so placed, whereas later they may become erect. Very numerous genera of the Pœcilosclerina have also a third kind of spicule, called echinating, because megascleres of this category have only a fraction of their length embedded in the tracts or fibers, the remainder protruding, so that the fibers are thereby rendered spiny. In some species of Pœcilosclerina the echinating spicules are the only auxiliary megascleres. Again, there may be even greater multiplicity due to the existence, as in the genus *Acarnus*, of one definite sort at the surface, in contrast to a different kind in the flesh, while a third echinates the fibers, which contain (are "cored" by) the fourth or principal variety.

Because each has so many different items that may be noted, listed and compared, among the Pœcilosclerina there is little danger that two species will be confused with each other. In contrast to this it is possible that specimens exist in the Haplosclerina for which new species should be established but which are identified with earlier names for lack of adequate data on which to base the argument in favor of separation. Consider for a parallel example from another phylum, the family of birds known as the Mniotiltidæ or wood-warblers. It is agreed that many of these, differing considerably in color of plumage, are to be regarded as different species. A person utterly color blind, however, might be scarcely able to find any difference. We may be merely "blind" toward characteristics that would help us greatly in dividing sponge groups properly into species.

A very large fraction of all the described genera of Porifera is of the order Pœcilosclerina. This is a direct result of the situation outlined in the preceding paragraph. The classification of this group therefore becomes quite cumbersome. It is here proposed, in order to simplify the arrangement, to subdivide the order into four artificial groups: first the Phorbasiformes, second the Plocamiiformes, third the Myxilliformes, and fourth the Microcioniformes. The general basis of separation is as follows: in the first group both the principal and at least some of the auxiliary spicules are diactinal; in the second the principal spicules are diactinal but the auxiliaries are monactinal; in the third this is just reversed so that the principal ones are monactinal, whereas the auxiliary megascleres are diactinal; in the fourth both principal and auxiliary spicules are monactinal.

PHORBASIFORMES

This artificial group is employed for the families Phorbasidæ, Adociidæ, Cœlosphæridæ, Agelasidæ and Taprobaneidæ. The last mentioned is provided for genera of lithistid sponges that, by inference, are considered as being more closely related to the other families mentioned above (in this paragraph) than they are to other lithistid varieties. The next to the last is a small very peculiar family put here only by mere surmise. The Cœlosphæridæ are remarkable for strange bodily form rather than for their spiculation. The really typical families of this artificial group are the Adociidæ and the Phorbasidæ. These show the closest relationship to the preceding order (the Haplosclerina) of any of the Pœcilosclerina. Some sponges are perhaps transitional forms between the two orders; for example, the following genera of Desmacidonidæ may possiby be regarded as having two categories of spicules: *Desmoxya*, *Dendoricella*, *Guitarra*, *Hamigera*, *Protophlitaspongia*, *Tedanione* and *Xytopsihis*. It is conceivable that some or all of these (and possibly others) might be better classified as Phorbasidæ, in which case the Phorbasiformes would appear even more closely knit than at present to the Haplosclerina. Of the Phorbasidæ, *Damiriella*, *Iophonota* and some species of *Didiscus* seem (probably due to lack of enough information on our part) not to have echinating spicules. These also indicate the relationship to the Haplosclerina.

PHORBASIDÆ new family

The genera of this family typically have dermal diactinal spicules recognizably different from the endosomal megascleres. In some species of *Pronax* and *Myrmekioderma*, and perhaps in a few other genera, it is not easy to make out that the dermal spicules are really different. That such a situation exists proves how perplexing it is to systematize such a group as the Porifera, wherein almost every conceivable characteristic blends into one or more other characteristics. Typically there are spiny echinating spicules also present, and in all the cases that are difficult to separate from the Desmacidonidæ of the Haplosclerina on the basis of the (dubious) presence of special dermal spicules, the certain presence of the spiny spicules determines the allocation to the Phorbasidæ. Those genera, such as *Didiscus* and *Iophonota*, that seem to lack the spiny spicules may really properly possess them, but in quantities so small that they have thus far been overlooked. In general this family is very poorly represented in the West Indies, but the type genus is from that region, as is also one species that should be referred to the genus *Echinodictyum*.

It is suggested that the Phorbasidæ be divided into two subfamilies, the Phorbasinæ (comprising the bulk of the genera) in which the ecotosomal spicules are predominantly or entirely smooth, and the Crellininæ (otherwise rather similar) in which the ectosomal spicules are predominantly or entirely spiny. The Phorbasidæ are not represented in the vicinity of the Dry Tortugas.

Scope of the Phorbasinæ

Damiriella Burton lacks echinating spicules, but is regarded by its author as an aberrant Myxillid. The ectosomal spicules are smooth tylotes, the endosomal are smooth strongyles, and there are "abundant isochelas." *Didiscus* Dendy is typical in that the echinating spicules are smooth, not spiny; they are tylostyles, there is enormous variation in the sizes of oxeas that make up the dermal and main skeletons. The general body plan of the genotype, which has a surface divided by conspicuous deep pore-grooves into sub-polygonal areas, is very much like that of *Placospongia* of the Hadromerina. The microscleres of the entire genus are also quite strange. They are discorhabds in the proper sense of the word, each with an oxeote axis and two concavo-convex discs placed on it; the concavities face the same way, the margins are entire, not toothed. These are to be compared closely with those of the fresh-water genus *Uruguaya*, but it is far from certain that they are derived at all as are the so-called discorhabds ("chessmen spicules") of the genus *Latrunculia* of the Choanitidæ (Hadromerina). It is frequently assumed, as for instance in the generic allocations made in the cases of the species about to be mentioned, that all sponges with true discorhabds are related intimately to those having merely so-called discorhabds (chessmen spicules) and the latter to each other, but there is no more reason to believe this than to put all genera with amphidiscs close together. Amphidiscs are found in the whole order Amphidiscophora of the class Hyalospongiæ, and in the family Spongillidæ of the order Haplosclerina, class Demospongiæ. Possession of similar microscleres means something, it must be admitted, but in the absence of other supplementary or confirmatory evidence is inadequate basis for systematic amalgamations. *Latrunculia acerata* Ridley and Dendy (1886, p. 492) seems to lack the echinating spicules, but the specimen was in poor condition and they may therefore have been lost; otherwise it is clearly very much like undoubted species of *Didiscus* and should be transferred to this genus.

Echinodictyum Ridley is thoroughly typical of the family Phorbasidæ, but lacks (or seems to lack) microscleres entirely. It was established for (has as its genotype) a specimen which among others was named *Spongia bilamellata* by Lamarck (1814, p. 436). Topsent (1932, p. 68) has pointed out that most of the specimens which Lamarck so named belong to another genus (*Cribrochalina*), including the type specimen of *bilamellata.* This leaves the remaining specimens lacking a name, and it is therefore here proposed that they be named *topsenti,* and the type will therefore become *Echinodictyum topsenti.* The sponge which Duchassaing and Michelotti (1864, p. 89) described as *Pandaros lugubris* is an *Echinodictyum,* seemingly the only one from the West Indies, because *Pandaros pennata* Duchassaing and Michelotti (1864, p. 88), while also of this genus, appears to be conspecific with and therefore falls in synonymy to *lugubris. Iophonota* new genus is here established for genotype *Iophon aceratus* Hentschel (1914, p. 88); of it the dermal spicules are strongyles, while the endosomal ones are oxeas. It may be that echinating spicules are rarely present but overlooked. The microscleres are of two sorts regularly associated together, palmate anisochelas with the smaller end oddly shaped and the microscleres called bipocilli, which same are very probably to be regarded as very greatly deformed palmate anisochelas. For comparisons see the genus *Iophon* in the Myxillidæ. *Kalykenteron* Lendenfeld, like *Echinodictyum,* lacks microscleres, but may be distinguished by the fact that the echinating spicules are acanthostrongyles instead of monacts. There is much spongin present. *Lissopocillon* Ferrer Hernández is very much like *Phorbas,* but in addition to having all the spicule sorts of the latter genus it also possesses anisochelas, a very strange combination indeed. *Myrmekioderma* Ehlers is almost exactly like the later genus *Kalykenteron,* except that the echinating spicules are acanthoxeas instead of acanthostrongyles; it should perhaps receive Lendenfeld's genus in synonymy. *Paramyxilla* Dendy and *Paratedania* Burton are two very puzzling genera. The first has principal acanthoxeas with auxiliary smooth tylotes; the second has principal smooth tylotes with auxiliary acanthoxeas. They might be suspected of being congeneric although with spicule sorts reversed, but for the occurrence in *Paramyxilla* of (arcuate?) isochelas and toxas. *Paratedania* has no microscleres. Neither is typical of the family where it is now placed, not of any other family, for that matter. *Phorbas* Duchassaing and Michelotti, the type of the family, is a West Indian genus, represented there, however, by only one recognizable species, the genotype, *P. amaranthus* Duchassaing and Michelotti (1864, p. 92). There are special dermal oxeas, over dissimilar oxeas of the reticulate skeleton, with echinating acanthoxeas; the microscleres are arcuate isochelas, with rare sigmas. *Phorbas viecquensis* Duchassaing and Michelotti (1864, p. 91) is not recognizably described nor represented by available specimens as is *amaranthus. Pronax* Gray is perhaps a synonym of *Phorbas,* differing from it only in the very slight respect that the dermal spicules are little if any to be distinguished from the endosomal, and more significantly by the somewhat plumose arrangement of the principal spicules in the skeletal tracts. To the extent that this genus is really plumose in architecture it is typical of the whole order Pœcilosclerina, however. The *Pronax* here employed is not that of Gray (1867, p. 526), which is a synonym of *Cliona* (if another name must be given it because it is preoccupied, let it be called *Grayax*). The *Pronax* that is a valid genus of Phorbasidæ is the one established by Gray (1867, p. 536) for *Hymeniacidon plumosa* Bowerbank (1866, p. 195) which Topsent (1894, p. 3, Rev. Biol. Nord France) showed was congeneric with the sponges later called *Plumohalichondria* (Carter, 1876, p. 236); this latter then falls in synonymy to *Pronax.*

Rhaphoxiella Burton was considered by its author to be a reduced Myxillid, thus indicating that it is quite different in structure from the Desmacidonidæ, and instead has the sort of architecture characteristic of the Pœcilosclerina in general including the Phorbasidæ. The special dermal spicules are strongyles. The larger spicules of the principal skeleton vary from strongyles to oxeas. There are no microscleres. *Zottea* new genus, genotype *Myxilla grata* Thiele (1903, p. 954), is here established for a sponge from the East Indies with dermal smooth tylotes; the principal spicules are lumpy strongyles, the microscleres are rhaphides, sigmas and isochelas that are probably to be regarded as arcuate, but which are atypical in that they have sharply pointed clads. *Zyzzya* new genus, genotype *Plocamis massalis* Dendy (1921 p. 78), is here established for an Indian Ocean species with dermal tylotes spined slightly on the ends; the principal spicules are spined strongyles and the microscleres palmate isochelas. *Xylospongia* Gray is put here on mere surmise, there are only diacts per description, but in general it can be characterized best as utterly unrecognizable.

Other generic names that need consideration here include *Anchinoë* Gray, *Crellomima* Rezvoy and probably also *Stylostichon* Topsent as synonyms of *Phorbas*. If the latter is not a synonym of *Phorbas* it is a synonym of *Pronax* as are the genera *Clathrissa* Lendenfeld and *Plumohalichondria* Carter.

CRELLININÆ new subfamily

Hentschel (1923, p. 406) employed a special family Crellidæ for all those sponges having special spiny dermal spicules but this seems inappropriate inasmuch as the consistent corresponding action would be to make a family for all those characterized by spiny endosomal spicules. To do this would be overwhelming, as most of the Pœcilosclerina and some of the Haplosclerina could be included. Instead, those having spiny endosomal spicules are here put among many families according to their other characteristics. Those having spiny ectosomal spicules are here regarded as subfamilies of the groups to which they would respectively belong as judged by their endosomal structures. The Crellininæ are much like the Phorbasinæ except for their acanthose dermal megascleres. The subfamily may be further divided systematically and conveniently on the basis of whether or not there are present echinating spicules and whether or not there are present chelas for microscleres. The chelas, when present, are normally arcuate. There appear to be no West Indian representatives of the Crellininæ except *Pytheilla* (*Cribella*) *papillosa* which Schmidt (1870, p. 57) recorded as having been collected at the Dry Tortugas!

Scope of the Subfamily

The typical genus is *Crellina* Hentschel. It has echinating spicules, but no chelas. For those close relatives of *Crellina* that have neither echinating spicules nor chelas I propose the new genus *Grella*, the genotype to be the sponge described as *Yvesia carnosa* Topsent (1904, p. 198). Another species for this genus is *Yvesia ridleyi* Topsent (1892, p. 30). For those close relatives of *Crellina* that have both echinating spicules and chelas I propose the new genus *Pytheilla*, the genotype to be the sponge described as *Grayella topsenti* Babić (1921, p. 85). Schmidt (1870, p. 57) described a species as *Cribrella papillosa* from "Florida, Tortugas" depth 250 meters. I have studied the gross morphology of a specimen so labeled (by Schmidt?) and preserved at the museum of the University of Strasburg. It, and Schmidt's description of the internal appearance, agree with that of the abundant Dry Tortugas species *Spheciospongia vesparia.* Schmidt's description of the spiculation might be of a sponge that should be referred to the new genus *Pytheilla.* Can it be that a mistake was made in labeling and that Schmidt described the spiculation of one species in conjunction with the habitus of another? A redescription based upon the original material would be most instructive. The name *papillosa* is left pro tem in *Pytheilla* with the above mentioned misgivings. A new genus *Damonilla* is here proposed, the genotype to be the sponge described as *Crellomima incrustans* by Hentschel (1929, p. 890). The ectosomal spicules are acanthostrongyles to acanthostyles. The endosomal spicules are strongyles to oxeas. The microscleres are anchorate isochelas with seven to nine clads at each end. There are special raised pore areas. The diagnosis should be given as spiny dermal diacts with smooth diacts in the principal skeleton, plus anchorate isochelas. For those species of Crellininæ having no echinating spicules but possessing chelas as microscleres, I propose the new genus *Yvesiorbas*, and establish as genotype *Myxilla pulvinar* Schmidt (1868, p. 14). The original description does not mention the chelas, but I have studied the species personally at Naples and find them in my specimens collected there. There are also other numerous instances where Schmidt neglected to mention the occurrence of important categories of spicules present in sponges he describes. Other members of this genus comprise *Sclerilla arctica* Hansen, *Sclerilla dura* Hansen, *Grayella gelida* Lundbeck, *Halichondria aceratospicula* Carter and *Amphilectus gergensteini* Swarchewsky.

Another genus, probably to be referred to Crellininæ is *Anisocrella* Topsent, which answers in general to the description given above for *Pytheilla,* except for the fact that *Anisocrella* has a very peculiar combination of microscleres, namely, palmate isochelas associated with tridentate (arcuate?) anisochelas. Another very interesting type of sponge to be referred to the Crellininæ has strongyles as principal spicules and as dermal spicules diacts with spines that are in turn spiny. Like the new genus *Grella* there are no microscleres, but the very peculiar ectosomal spicules require the erection of a new genus for which the name *Aaaba* is hereby proposed, the genotype and only species to be that described as *Yvesia alecto* by Topsent (1898, p. 248).

ADOCIIDÆ new family

The family as here proposed corresponds with the diagnosis given by Ridley and Dendy (1887, p. LVIII) to their subfamily Gelliinæ, subsequently often regarded as a family (see Hentschel, 1923, p. 407). It is by no means certain, however, as will be mentioned below, that the genus *Gellius* itself belongs to this family, because it is poorly known.

This family differs from the Desmacidonidæ, to which it is closely related, chiefly in the possession of a special dermal skeleton. The megascleres are all, or nearly all, diactinal, and there are very numerous sorts of microscleres present. None of the Adociidæ have echinating spicules as do most all of the Phorbasidæ; this is probably the greatest single point of difference between the two otherwise very similar and clearly closely related families. The genera referred here also approach closely to the family Haliclonidæ of the order Haplosclerina, from which they differ principally in that they have at least a trace of a special dermal skeleton which is quite absent from the sponges of the Haliclonidæ. The Adociidæ also resemble the Halichondriidæ of the order Halochondrina, from which they differ in their greater variety of microscleres and especially in their more reticulate form. Any hard and fast line that may be drawn in cases such as this must necessarily be arbitrary. This family is well represented near the Dry Tortugas and in the West Indian region in general.

ADOCIA Gray

This genus was established by Gray (1867, p. 522) for *Isodictya simulans* of Bowerbank (1866, p. 308), which Bowerbank states was a synonym of *Halichondria simulans* of Johnston (1842, p. 109). Bowerbank in describing the species *simulans* states plainly, "Dermis furnished with a strong irregular reticulation of single spicula." This has since been frequently overlooked; for example in diagnosing his new genus *Adocia*, Gray quite erroneously says, "Skin without spicules." Burton in 1934 in his monograph of the *Sponges of the Great Barrier Reef* makes properly clear that just this point which Gray overlooked is the critical factor in connection with the genus *Adocia*. Furthermore, on page 535 of this article, Burton accepts Bowerbank's specimen of *Isodictya cinerea* as the neotype of *Spongia cinerea* Grant and demonstrates on the basis of specimens in the British Museum of Natural History in London that this is conspecific with Bowerbank's specimens of *Isodictya simulans* which were the basis of Gray's genus *Adocia*. For this reason the genotype of this group can not be known as *Adocia simulans* Bowerbank, but must instead be called *Adocia cinerea* Grant. Another result is that the exceedingly abundant cosmopolitan species which has been known as *Reniera cinerea* Grant must now receive some other name; presumably it may be called *Haliclona permollis* Bowerbank unless study of actual specimens proves beyond a shadow of a doubt that some earlier species name is conspecific here. It is most regrettable that Burton has forced this confusing situation upon students of sponges by his unhappy choice of a neotype.

Topsent (1925, p. 712) in his monograph of the *Sponges of Naples* records there a well-characterized sponge which I found to be of very unusual color, inasmuch as individual specimens are in some portions yellow and in other portions violet. This Topsent identified as being the above-mentioned *simulans*. When working at the Marine Biological Station in Naples in 1928, I found this species fairly common and studied it carefully. Upon comparing it to microscopical preparations of the type of *simulans*, that is to say, *cinerea*, from Britain, I find that the Naples species has subdermal cavities extending over practically the entire surface of the sponge, which is not true of the British. The special dermal skeleton is obviously present and very neatly symmetrical, but not so thick and densely spiculous as is true of the British specimen. A third difference is the color. The Neapolitan sponge would seem, therefore, to require a new specific name, and I propose accordingly that it be termed *Adocia dohrni* in respect to the eminent zoologist, Dr. Reinhard Dohrn, director of the Marine Station at Naples.

In the genus *Adocia* the spicules consist exclusively of smooth diacts, with no microscleres. This is also true of the very numerous species which have hitherto been referred to the genus *Reniera*. Unlike many of these numerous species, however, *A. cinerea*, as mentioned above, has a special (tangent) ectosomal skeleton. *Halichondria* also has a similar, or even more strongly developed dermal specialization. When a specimen of *Adocia* is so modified that the skeleton is confused rather than being nicely reticulate as is usual, it becomes exceedingly like an *Halichondria*. *Haliclona* species lack special dermal skeletons. When this part of an *Adocia* is missing or feebly developed, it becomes perplexing in the extreme to discriminate whether or not the specimen is an *Haliclona*. These items may indicate close relationship of Haliclonidæ to Adociidæ to Halichondriidæ. On the other hand, these resemblances may have been arrived at separately from different origins by simplification or degeneracy.

In the above-mentioned reference, *Sponges of the Great Barrier Reef*, Burton discusses *Adocia* at length, and would refer a relatively large number of species and genera in synonymy here. This he does because he would include in *Adocia* all sponges having the same characteristics as to megascleres, regardless of microscleres. He points out the undoubted fact that categories of microscleres are occasionally lost from sponges, and draws the conclusion that microscleres are therefore insignificant. He calls sponges identical that differ from each other so greatly that one kind has no microscleres, another has sigmas and another has toxas. We should not be hasty in criticizing this because there are grave reasons for suspecting that Burton is quite right. I would recommend, however, adopting a different procedure, not on the grounds that my suggestion is right and Burton's is wrong, but solely on the grounds of expediency. Whereas one race of sponges having no microscleres may be genuinely congeneric or even conspecific with another race having sigmas, we must remember that sometimes it is necessary to discuss one in contrast to the other. For instance, we may investigate as to whether in a certain locality there occur only those with sigmas, or only those without, or both. One might wish to discuss physiological differences occurring or presumed to occur between the two sorts. Furthermore it should be noticed very carefully that we are by no means certain that Burton is right. There is a decided possibility that the sorts of sponges lacking microscleres may not be conspecific or congeneric with those having sigmas and toxas. In view of this decided possibility and in order to facilitate the precise reference to categories of sponges, I propose that different genera be maintained for those that differ radically in their content of microscleres.

Adocia neens (Topsent) new combination

Plate 12, fig. 1.

This species was found growing on the wall of the moat at Fort Jefferson just below low tide, on July 27, 1927, and again on June 28, 1932.

This sponge is an encrustation about 1 cm. thick and 5 cm. in diameter. As found in the Dry Tortugas, the color in life was a very pale purple, nearly white, turning white in alcohol. The consistency is very fragile, only slightly compressible. The surface is nearly smooth, with a few of the vents raised 10 to 15 mm. above the bulk of the sponge; they are 3 to 4 mm. in diameter. A layer about 16μ thick may be regarded as the dermis, it is easily detachable, very symmetrical in structure, and reminds one very much of the ectosome of the genus *Callyspongia*, but lacks the spongin sheaths about the fibers. In *Adocia neens* there are first thick protoplasmic strands, roughly about 100μ in diameter, but varying greatly, which make the reticulation with meshes 250 to 600μ in diameter. These meshes are in turn walled in with nets of spicules connected with each other at the apices only, with bits of spongin, forming a so-called isodictial reticulation with triangular or quadrangular meshes about 100μ in diameter. These smaller meshes are further walled in by sheets of organic material scarcely more than 3 to 5μ thick, pierced abundantly by almost circular holes (pores?) 35 to 40μ in diameter. The endosome is "crumb-of-bread" in architecture, also somewhat isodictyal. It contains a very few vague tracts of three to five rows of spicules, having a total diameter of about 30μ apiece. It will be noted that this latter is very different from the structure in the genus *Callyspongia*. In the 1927 specimen the structure was even denser, with triangular meshes approaching very close indeed to isodictyal. The commonest spicule is a slightly curved diactine, usually oxeote, but sometimes verging toward the strongylote, about 5 by 118μ in dimensions. Many of the spicules are much thinner, down at least to 1 by 105μ.

This species was described by Topsent in 1918 (p. 536) as *Reniera neens*, from the West Indian region; his description is rather briefer than the above, but in all respects that he mentioned is in complete agreement with the specimens as found at the Dry Tortugas. Perhaps the most remarkable thing about this (as compared to other members of this species of the genus *Adocia*) is the *Callyspongia*-like structure of the dermis; the tendency to strongylote megascleres is also worthy of notice, although not especially uncommon.

PELLINA Schmidt

This genus is remarkable chiefly for its external shape; otherwise it is indistinguishable from *Adocia*. There is a massive fragile main portion, and from this arise tall brittle chimney-like processes. They are perhaps to be termed fistular, but they are not closely comparable with the fistulas of *Polymastia*. They appear to be enormous prolongations of the raised rims or collars often found about oscules. The endosomal reticulation is isodictyal, with little spongin other than that which barely cements spicules together. There are considerable subdermal spaces under a raised ectosome containing more or less tangentially placed spicules. As Dendy (1894, p. 240) comments in regard to *Eumasta* (which is a synonym of *Pellina*), this is like *Oceanapia* except that *Pellina* lacks the bast-like subdermal structures of *Oceanapia*. *Pellina profunditatis* Schmidt (1870, p. 42) is a name recorded from the West Indies, but as a species of sponge it is unrecognizable.

Pellina carbonaria (Lamarck) new combination

Plate 18, fig. 5.

This species is exceedingly abundant in the vicinity of the Dry Tortugas in shallow water, that is to say, from a depth of about 1 meter down to perhaps a depth of 5 or 10 meters, being rarer and rarer at increasing depths.

The shape is fundamentally massive and often about 15 cm. in diameter and 6 cm. thick. From this basal mass, which is often buried in the sand, rise conspicuous chimneys or oscular processes, doubtless useful in preventing entry of sand to the interior of the sponge. The danger of this is not always avoided inasmuch as coarse grains of coral sand are frequently found in the endosome of this species. These processes are 4 to 10 mm. in diameter, with a central hollow core 2 to 6 mm. in diameter, and they often reach heights of 3 to 8 cm. The color in life and preservative is a green, so very very dark that it may be almost called black. The consistency is delicately elastic, easily torn or cut. The surface is smooth, with an ectosome that is a dermis 10 to 30μ thick, filled with strewn, tangentially arranged spicules that often cross each other rather than making the so-called isodictyal pattern. In this respect the species is more like one of the Halichondriidæ than one of the Adociidæ. The pores are very numerous, with strands separating them that are narrower than the pore diameter, which latter varies from 25 to 65μ, but is very often 40μ. As noted above, the oscules are 3 to 5 mm. in diameter, communicating with numerous subdermal canals about 150μ in diameter. The endosome is more or less isodictyal and very fine grained between the small gross chambers which to the naked eye cause the structure to resemble bread. The endosome is further abundantly supplied with ascending tracts about 35μ in diameter, each consisting of about ten rows of spicules loosely cemented together. These tracts are 120 to 150μ apart and are connected here and there by irregular spicular formations, very abundant spicules also being strewn loose in the flesh. Only one sort of spicule may be said to be present, but this is subject to an interesting variation. This is fundamentally a strongyle, 4.5 by 164µ, sometimes reaching 5 by 172µ; and again being often much smaller. The ends of the spicules are sometimes provided with caps of successively smaller diameters, however, so that to the low power of the microscope the appearance is as of oxea; whereas with a high power the successive steps are very plain.

Lamarck described this sponge as *Spongia carbonaria* (1814, p. 375). I have studied his original specimen and would comment that it has fewer of the strongylote spicules and more ordinary oxeas, and that these average somewhat larger than in most Dry Tortugas specimens; the agreement is very close, however, and I should say that the two forms were clearly conspecific. Topsent (1930, p. 26), in redescribing Lamarck's specimen, referred *carbonaria* to the genus *Phlœodictyon*, a genus characterized by a very pulpy endosome, conspicuous rind, and proper fistules. This species *carbonaria* does not have a very pulpy endosome, its ectosome is not very thick, and its protrusions are merely exaggerated oscular collars rather than proper fistules. As compared to other members of the genus *Pellina*, the black color of *carbonaria* is very distinctive. Lamarck's specimen presumably came from the West Indies.

Scope of the Family

In some ways the most typical genus of the family Adociidæ is *Orina* Gray, which is characterized by the ordinary architecture, by diactinal megascleres and by both sigmas and toxas as microsclers. There are about fourteen species which belong in this genus and now chiefly referred to the so-called genus *Gellius*; these may be listed as follows: *Halichondria angulata* Bowerbank (1866, p. 233), the type of *Orina* per Gray (1867, p. 539), *Gellius arcoferus* Vosmaer (1885, p. 29), *G. arneseni* Arndt (1928, p. 151), *Gelliodes consimilis* Lundbeck (1902, p. 77), *Gellius dubius* Babić (1921, p. 80), *G. esper* Arnesen (1903, p. 7), *G. flabelliformis* Ridley and Dendy (1886, p. 334), *G. luridus* Lundbeck (1902, p. 64), *G. massa* Arnesen (1903, p. 7), *G. microtoxa* Lundbeck (1902, p. 67), *G. petrocalyx* Dendy (1924, p. 321), *G. ravus* Stephens (1912, p. 22), *G. regius* Brøndsted (1924, p. 447), and *G. tylotoxus* Hentschel (1914, p. 131). It is interesting to compare *Orina* to the genus *Sigmaxinyssa* of the family Desmacidonidæ, because the spiculations of the two are practically identical. *Sigmaxinyssa*, however, seems to lack the special dermal skeleton. There are two species which at first glimpse appear to belong in *Orina*, which are probably better placed in *Sigmaxinyssa*; they include the type of this latter genus, *P. phakellioides* Kirkpatrick (1907, p. 423), transferred to *Gellius* by Burton (1929, p. 423) (*Terra Nova* Report), and *Gelliodes plexa* Lundbeck (1902, p. 75), transferred to *Gellius* by Burton (1930, p. 498). Between *Adocia* with no microscleres and *Orina* with both sigmas and toxas there are many sponges having only sigmas and a few species with only toxas. The former group usually referred to *Gellius*, as discussed below, needs a new name, for which I hereby propose the generic designation *Sigmadocia*, and wishing to have as a genotype a species with which I am familiar I suggest *Gellius texapatina* de Laubenfels (1926, p. 567). So many species are involved here that no efforts will be made to list them all. For the species having the structure and megascleres of *Adocia* and only toxas as microscleres the new genus *Toxadocia* is hereby proposed with the genotype established as *Gellius abbreviatus* Topsent (1918, p. 538); this is a West Indian species, the only one for the genus from that part of the world. The following other species now referred to as *Gellius* would appear also to belong properly to *Toxadocia: Isodictya fallax* Bowerbank (1866,

p. 302), *Gellius primitivus* Lundbeck (1902, p. 69), *G. proximus* Lundbeck (1902, p. 70), *G. tener* Topsent (1927, p. 18), *G. toxius* Topsent (1897, p. 470), *G. toxophorus* Hentschel (1912, p. 392), and *G. toxotes* Hentschel (1912, p. 392). On the basis of the evidence presented by Burton (1934, p. 537), the following species should be transferred to the genus *Sigmadocia: Siphonochalina pumila* Lendenfeld (1887, p. 806), *Gelliodes spinosella* Thiele (1899, p. 22), and *Gelliodes porosa* Thiele (1903, p. 943).

The following genera seem to be typical members of the family Adociidæ: *Melophlus* Thiele has spiny microxea for microsclers. *Menanetia* Topsent, which in many respects is like *Adocia*, differs in that the dermal spicules are a different size from those of the endosome, and perhaps it should be dropped in synonymy to *Adocia*. *Pachypellina* Burton is very much like *Adocia*, except that the spicules are hastate instead of simple oxeas and the dermal area is very dense.

Petrosia Vosmaer is characterized by having strongyles of two lengths and oxeas of two lengths, making the most complicated spiculation of megascleres of any genus in the family Adociidæ. Three species described originally as in the genus *Petrosia* presumably should be transferred to the genus *Xestospongia*, they are *exigua* Kirkpatrick (1900, p. 135), *hispida* Ridley and Dendy (1886, p. 327), *mammiformis* Dendy (1921, p. 36). *Alcyonium testudiarium* Lamarck (1815, p. 167), referred to *Petrosia* by Hentschel (1912, p. 403), also should be transferred to *Xestospongia*. The species described from the West Indies by Schmidt (1870, p. 44) as *Scmidtia muta* is also a *Xestospongia*. The genus *Strongylophora* Dendy is characterized by having rhaphides and sigmas as microscleres and strongylote megascleres; it therefore approaches very close to *Sigmadocia*. In many species of this family the megascleres vary within one specimen from oxeote to strongylote and it seems difficult therefore to maintain separate genera on the basis of only this megasclere shape. It should be noted that the spicules above referred to as being sigmas are not typical but merely slightly bent rhaphides. Were strongyles as opposed to oxeas to be regarded as a sufficient basis for establishing new genera in the family Adociidæ, a new genus could be established for such species now in *Gellius* as *strongylatus* Lindgren (1897, p. 481), *reptans* Whitelegge (1906, p. 462), and *truncatus* Kieschnick (1896, p. 531). *Strongylophora rampa* de Laubenfels (1934, p. 19) is West Indian.

Among genera which are referred to the Adociidæ with some hesitation we find *Baikalospongia* Annandale, which has only tylote spicules. Its type should be established as *Lubomirskia bacillifera* Dybowsky (1878, p. 22). A somewhat similar genus is *Damira* Keller which has tylotes that vary in the direction of strongyles and which are uniformly smooth, whereas those of *Baikalospongia* are minutely spined on the ends. A very interesting type of sponge is represented by that described as *Gellius calyx* by Ridley and Dendy (1886, p. 334). This is a soft cup on a hard stem, having oxas and sigmas for spiculation. A new genus is hereby proposed for it, namely *Calyxadocia*, having reference to the obvious resemblance to the genus *Calyx*, here regarded as belonging to the family Halichondriidæ rather than Adociidæ.

There are several genera, rather poorly described, which we can recognize as perhaps belonging to the family Adociidæ, but about which we can say little more than that. They include *Damo* Gray, *Dymnus* Gray, *Gellius* Gray and *Protoschmidtia* Czerniavsky. From those assigned to the latter genus the following species need to be transferred: *cerebrum* Burton (1928, p. 116) to *Xestospongia; expansa* Thiele (1903, p. 939) to *Xestospongia; pulvillus* Thiele (1903, p. 939) dubiously to *Eumastia*; and *hispidula* Ridley (1885, p. 414) to *Phycopsis*. *Asychis* Gray may be a synonym of *Adocia*, its genotype needs to be understood as being the sponge described as *Reniera fibulata* by Schmidt (1862, p. 73).

Gellius Gray has been frequently used for those sponges here assigned to the new genus *Sigmadocia*, but Burton (1934, p. 530) redescribes the genotype of *Gellius*. He states that it is a minute incrustation very difficult to compare with other species. On the basis of the evidence which he presents in the above-mentioned citation we must certainly regard *Gellius* as an unrecognizable genus, not even certainly belonging to the Adociidæ.

Some names that must be considered in this regard, but which fall in synonymy to other genera, comprise the following: *Amorphina* Schmidt has been by Burton (1934, p. 536) shown to be a synonym of *Adocia*; several species have been described as of this genus from the West Indian region by Oscar Schmidt (1870, p. 41). Of these *solidor* was from the Dry Tortugas, but is poorly described and may even be epipolasid; *A. terebrans* from St. Thomas should be transferred in synonymy to the genus *Aka*, and *turritella* from Florida must be characterized as being utterly unrecognizable. *Chalinopora* Lendenfeld is also referred in synonymy to *Adocia* by Burton. *Eumastia* Schmidt is a synonym of *Pellina*. *Halichoclona* de Laubenfels should also be referred in synonymy to *Adocia*. *Schmidtia* Balsamo Crivelli is a *Petrosia*, as is also *Tedaniella* Czerniavsky.

CŒLOSPHÆRIDÆ Hentschel

The basis for establishing this family is almost exclusively its peculiar external form and internal structure. The sponges belonging to this family are more or less spherical, with a rather tough cortex, within which is a very pulpy, almost impalpable endosome. This endosome in some specimens is wanting, being replaced by cavities filled with liquid. From the tough outer layer more or less numerous fistules protrude; these are sometimes so numerous as to make up a large fraction of the bulk of the sponge. The spiculation is in general very like that of the Phorbasiidæ. The occasional monactine spicules may be interpreted as being possibly echinating, but they are not typically so because of the peculiar almost non-fibrous structure. Although fairly common in the West Indian region, this family does not seem to be represented at all in the immediate vicinity of the Dry Tortugas.

Scope of the Family

The genera typical of the family Cœlosphæridæ comprise the following: *Amphiastrella* Dendy has strongylote and tylote megascleres, also birotulate and sigmoid microscleres. Burton (1929, p. 439) referred *Amphiastrella kirkpatrickii* Dendy (1924, p. 371) to the genus *Inflatella*. There may be some mistake in the published description by Dendy, but judging only by the text and the figures, there seems to be no good reason for the transferal and I therefore propose, pending published redescription indicating to the contrary, that *kirkpatrickii* be returned to the genus *Amphiastrella*. *Cœlocarteria* Burton has many monaxons, that is to say styles, as well as diactinal strongyles for megascleres, arcuate chelas and sigmas as microscleres. *Cœlosphæra* Wyville Thomson has the typical habitus. The megascleres are tylote, and the microscleres are arcuate isochelas and sigmas. *Cœlosphærella* de Laubenfels instead has palmate isochelas and toxas. Its genotype, *C. johnsoni* de Laubenfels (1934, p. 21) is West Indian. A new genus is needed for *Histodermella australis* Dendy (1924, p. 373) and I therefore suggest that it be called

Hiltonus in respect to the eminent zoologist, Professor W. A. Hilton. This genus has, as principal spicules, diactines that vary from tylotes to strongyles, which are supplemented by presumably echinating acanthostyles; there are sigmas for microscleres. *Histodermella* Lundbeck is a genus typical of the Cœlosphæridæ; its genotype needs to be established as *H. ingolfi* Lundbeck (1910, p. 14). It is characterized by diactinal megascleres that vary from smooth oxeas to acanthoxeas, and there are arcuate chelas and sigmas as microscleres. *Histodermella coriacea* Lundbeck (1910, p. 16) differs considerably from the above type, having strongylote principal spicules, varying from spined only at the ends to spined throughout, and lacks microscleres entirely. I propose for it as genotype the new generic designation *Histodermopsis*. *Histodermion* Topsent has palmate isochelas, and principal spicules that vary from tylostyles to smooth strongyles to acanthostyles. *Inflatella* Schmidt has only strongyles for spicules. It would seem that *Oceanapia bacillifera* of Wilson (1904, p. 128) should be referred to this genus. *Inflatella bartschi* de Laubenfels (1934, p. 21) is West Indian. *Oceanapia* Norman differs from the above in having sigmas also. Its genotype needs to be established as *Desmacidon jeffreysii* Bowerbank (1866, p. 347). To this genus should be transferred the nearly unrecognizable species described by Schmidt (1880, p. 76) as *Rhizochalina fibulata*. *Phlyctænopora* Topsent has as principal spicules oxeas that verge toward strongyles; for microscleres there are sigmas and palmate anisochelas. *Pyloderma* Kirkpatrick closely resembles *Inflatella*, but has oxeas instead of strongyles, and also there is much resemblance to the genus *Latrunculia*. Its genotype needs to be established as *Halichondria latrunculioides* Ridley and Dendy (1886, p. 326). There is further reason to believe that perhaps it should be dropped in synonymy to the following genus, namely *Rhizochalina* Schmidt, which also has only oxeas as spiculation. Schmidt emphasizes the roots, but these are perhaps an ecological factor. Schmidt's *Rhizochalina carotta* (1870, p. 36) should presumably be transferred to *Oceanapia*. The genotype of *Rhizochalina* should be established as *R. oleracea* Schmidt (1870, p. 35), which is a very common species in the West Indies. Another essentially unrecognizable form named from the West Indies by Schmidt (1879, p. 76) is *Rhizochalina amphirhiza*. *Siderodermella* Dendy has tylotes as principal spicules to which smooth styles may or may not be added. There are very peculiar palmate isochelas, tridentate isochelas, sigmas and rhaphides, giving this form a very remarkable spiculation.

The family location of the genus *Heteroxya* Topsent is very obscure. There are large smooth oxeas and small spiny oxeas, so often perpendicular to the surface that their arrangement is not typical of the family Cœlosphæridæ, although much of the general architecture is. *Astrostoma* Gray must also be regarded as inadequately known.

In connection with the family Cœlosphæridæ we have a list of five generic names that are to be regarded as synonyms of other genera. *Histioderma* is a synonym of *Cœlosphæra*, as is also *Histoderma*, both by Carter. It is difficult to understand why Burton in his report on the sponges of the Great Barrier Reef (1934) should use this later genus instead of the earlier one of Wyville Thomson. *Joyeuxia* Topsent is a synonym of *Inflatella*. *Phlœodictyon* Carter falls to *Rhizochalina*. The type of *Phlœodictyon* should be established as *Phlœodictyon isodictiforme* Carter (1882, p. 122). *P. hondurasensis* Carter (1882, p. 122) is a West Indian form, but very inadequately known; only a piece of fistule was discovered and this may have been from any of several different species. *Sideroderma* Ridley and Dendy falls in synonymy to *Siderodermella*.

AGELASIDÆ Verrill

This family is established for genera that have no principal spicules at all, nor any dermal auxiliary ones, only those that may be termed echinating. In typical cases there are spongin fibers echinated by these secondary spicules or they may be localized at the surface of the sponge. Such fibers or tracts are devoid of any proper spicules whatever. It may be assumed that primitively other spicules were present, but what they were we can only surmise. Upon the assumption that they had been diactinal, the family is here put in the artificial group Plocamiiformes, but it is quite possible that instead a closer relationship may exist to the Microcioniformes. It is also of course quite possible that some of the genera referred here are reduced relatives of Plocamiiformes and others are reduced relatives of other groups, in which case the Agelasida would be polyphylectic. Still further reduction would lead in the direction of the family Spongiidæ. Representatives of this group are relatively common in the West Indies, one form being found at the Dry Tortugas.

AGELAS Duchassaing and Michelotti

This genus has the characteristic of the family, spongin fibers not cored at all, but echinated profusely by acanthostyles, which have the spines arranged in nodal whorls. All the species originally assigned here by the authors are West Indian forms, as is also *Agelas schmidti* Wilson (1902, p. 398). The genus is significantly redescribed by Burton and Rao (1932, p. 356). The species (*sparsus*) described below is thoroughly representative of the genus.

Agelas sparsus (Gray) new combination

Two specimens of this species were collected in 1931 near the Dry Tortugas by Dr. Waldo L. Schmitt of the U. S. National Museum.

These are massive sponges, more than 5 cm. in diameter and 10 cm. high. At the time of collection they were already dead and macerated so that only skeletons are available for study. The consistency is very spongy, although rather stiffer than the ordinary commercial sponges. At a distance the appearance is very much that of an already trimmed sheepswool sponge, the meandering surface grooves bearing out the similarity. These grooves are over 5 mm. wide and 8 mm. deep; in life they were presumably covered by an ectosomal structure of some sort. Canals more than 6 mm. in diameter thoroughly riddle the entire interior of the sponge, rendering it somewhat cavernous. The bulk of the endosome is a reticulation of clear spongin fibers about 40µ in diameter, forming subrectangular meshes 150 to 500µ across. Through this groundwork ascend fibers toward the surface of the sponge, which principal or ascending fibers are about 750µ apart and about 125µ in diameter. The spicules occur only on the surfaces, echinating the fibers abundantly. They are often at right angles to the fibers, only their heads embedded in the spongin. They are symmetrically annulate acanthostyles, usually 9 by 111µ; a very few malformations are acanthoxeas, and some smaller styles 9 by 95µ are irregularly, instead of symmetrically, acanthose. There are typically about twelve whorls per spicule and about six spines per whorl.

This species was first recognizably described as *Chalinopsis clathrodes* by Schmidt (1870,p. 60). He commented very particularly on the remarkable extent to which it resembled the commercial sponge. One is led to wonder if perhaps the genus *Spongia* may not be derived from the genus *Agelas* by a still further reduction in the spiculation. Against this, however, is the fact that the commercial sponges have a very different surface, with a tough, rather horny cuticle and more pronounced conules than is the situation in the genus *Agelas*. Other species in this genus do not show so much resemblance to *Spongia* as does *sparsus* and differ also in the number of spines per whorl and the number of whorls per spicule. Apparently the first name that was applied to this species was *Ectyon sparsus* Gray (1867, p. 515). The sponge would be entirely unrecognizable from Gray's description alone, but Carter (1871, p. 270) found Gray's original specimen in the British Museum and redescribed it, proving the synonymy; Gray's name being the earlier, it should be used.

Scope of the Family

Among the other genera that are here referred to the family Agelasidæ is the genus *Acanthostylotella* Burton and Rao. This has less spongin than in the genus *Agelas*, and the spicules do not have the spines arranged in whorls but merely distributed irregularly as is true of most acanthoxeas. On the basis of published evidence it would seem that *Spongia surculosa* Esper (1806, p. 39) should be transferred to this genus. *Scopalina* Schmidt also has only auxiliary spicules, but these are practically not spined at all; as in *Agelas*, there is a good deal of spongin present. *Scopalina cæspes* Ehlers (1870, p. 20) is certainly not congeneric with the other proper members of *Scopalina*, but where does it belong? It is hereby referred somewhat dubiously to the genus *Amphilectus*.

The genus *Ophistospongia* Gray would seem perhaps to have been a member of the family Agelasidæ, but it is so inadequately described that it is put here merely upon surmise. Its genotype should be established as *O. australis* Gray (1867, p. 515).

Other generic names which need consideration here include *Chalinopsis* Schmidt, which is a synonym of *Agelas*. It should be noted that this is quite different from *Chalinopsis* of Lendenfeld, a later genus. Schmidt's genus should have established as its genotype *C. cervicornis* Schmidt (1870, p. 60), which is a West Indian species as is also *C. conifera* Schmidt (1870, p. 60). *Ectyon* Gray is a synonym of *Agelas*, and should have established as its genotype *E. sparsus* Gray (1867, p. 515). This, as is noted above, is a West Indian species. Finally there is *Oroidea* Gray, which is also a synonym of *Agelas*.

TAPROBANEIDÆ new family

This is one of the puzzling lithistid families. The lithistid families are characterized by so-called desmas, which are spicules so given over to lumps and spines, and lumps upon lumps, and spines upon spines, that the resulting mass bears little resemblance to the original starting point. In many cases, particularly when immature spicules are present, it is possible to allocate lithistid sponges rather closely to the family most nearly related to them. In other cases it is very difficult to do so.

Scope of the Family

Taprobane Dendy has only sigmas and desmas for spicules, but the desmas seem to be greatly distorted oxeas, and therefore the resemblance would be very close to the Adociidæ. In this connection we have for consideration the genus *Leiodermatium* of Schmidt, of which the genotype *L. lynceus* Schmidt (1870, p. 22) is from the West Indies. Being older than *Taprobane* this should be type of the family, but for the fact that it is very poorly known and its actual allocation is more uncertain than that of *Taprobane*.

PLOCAMIIFORMES

This artificial group is employed for the families Plocamiidæ, Acarniidæ, Cyamonidæ, Astroscleridæ and Tremaulidiidæ. The last mentioned is provided for genera of lithistid sponges that by inference are considered as being more closely related to the other families mentioned above (in this paragraph) than they are to the other lithistid varieties. The next to the last is a small very peculiar family put here only by mere surmise. The Cyamonidæ have extraordinary tractional megascleres, very unexpected in the Pœcilosclerina. The Acarniidæ (based upon *Acarnia* not on *Acarnus*) are in general rather ill-known sponges. The only typical family of the group is the Plocamiidæ. The indications are, that of all sponges with distinctly different endosomal and ectosomal spicules, species in which the principal ones are monactinal predominate. Perhaps many of those genera in which there are only diacts represent instances where a primitively only dermal skeleton has been exaggerated at the expense of the original inner one. Perhaps many of those genera in which there are only monacts represent instances where the primordial dermal skeleton has been lost or deformed. Perhaps only a rare shift about or double alteration has yielded the few clearcut instances of ectosomal monacts accompanied by endosomal diacts; this is the spiculation typical of the Plocamiiformes.

It is here suggested that the Plocamiidæ be divided into two subfamilies, the Plocamiinæ (comprising the bulk of the genera) in which the ectosomal spicules are predominantly or entirely smooth, and the Crellinæ (otherwise very similar) in which the ectosomal spicules are predominantly or entirely spiny. The Plocamiinæ that occur near the Dry Tortugas will be considered first.

PLOCAMIIDÆ Topsent

In this family there is a main skeleton of diactinal spicules more or less reticulate in arrangement, or coring a reticulation of spongin fibers. To them are added auxiliary monactinal spicules, usually at the surface of the sponge and therefore to be regarded as special dermal spicules, but occasionally merely in the interstitial regions near the surface of the sponge, rather than localized at the ectosome proper. In the type genus, the principal spicules are smooth, but in very numerous genera of this family they are spiny. This is somewhat in the way of resemblance to the group of sponges here termed Acarniidæ, and explains this inclusion of that family in the Plocamiiformes.

HOLOPLOCAMIA new genus

Plocamia gymnazusa Schmidt (1870, p. 62), a West Indian sponge which is the genotype of the genus *Plocamia*, is not very well known, but it is clear from the description that its principal spicules were smooth. There is a decided lack of fibers; beyond that we do not know details as to the architecture. Many of the sponges referred to the genus *Plocamia* differ from it in having spiny principal spicules. I propose, therefore, a new genus for this larger group of species, the genotype to be the new species *pennyi*. In addition to the spiny diactinal principal spicules, there are auxiliary smooth monacts, and, as in *Plocamia*, for microscleres there are palmate isochelas and toxas. Among the other species that should be referred to *Holoplocamia* are *Isodictya coriacea* Bowerbank (1874, p. 136), *Dirrhopalum novizelanicum* Ridley (1881, p. 482), and the following species first described as of the genus *Plocamia: elegans* Dendy (1921, p. 77), *erecta* Ferrer Hernández (1923, p. 248), *inconstans* Topsent (1925, p. 662), *plena* Sollas (1879, p. 44) and *ridleyi* Hentschel (1912, p. 387).

Holoplocamia penneyi new species

The holotype, U. S. Nat. Mus. Cat. No. 22460, formed an encrustation on a mass of oolithic limestone dredged from a depth of 70 meters on June 16, 1932, southeast of Loggerhead Key.

This specimen is scarcely 1 mm. thick and covered a little more than 1 sq. cm. of the stone. In life it was brownish orange. We have too little data with respect to it to be able to cite its consistency. The surface is minutely lumpy. Pores and oscules do not show. In sponges so exceedingly small at this, the spiculation must be the principal matter to be described. In this species there is a basal mass of acanthostrongyles making a dense isodictyal reticulation. These spicules are about 7 by 122μ. Among them are a few acanthostyles 9 by 97μ, the pointed half being smooth or almost smooth. Here and there through the encrustation, in fact almost close enough to touch each other, are plumose tufts of large smooth styles 12 by 385μ. It often appears that the spicule in the middle of the tuft, the one that is most nearly perpendicular to the surface of the sponge, is larger than the others. This particular arrangement is very characteristic of the family Plocamiidæ in general. For microscleres, there are present abundant toxas of very great size range. Some are at least as small as 0.5 by 30μ, many are about 1 by 50μ, and some at least as large as 2 by 80μ. There are also abundant little palmate isochelas, with an unusually great rotation of the shaft, so that when one of the ends may be seen almost in full face view, the other is seen in profile. The total length of these chelas is about 12μ.

This species may be compared to *Plocamia elegans* of Dendy mentioned above, which has slightly larger chelas, but all the other spicules much smaller, and is ramose instead of merely encrusting; *elegans* is recorded from the vicinity of the Azores and from the Indian Ocean. *Novizelanicum* from New Zealand bears a few points of similarity, though the shape of the spicules is rather different, the toxas are about the same size but all the other spicules are much larger. Burton and Rao (1932, p. 355) would drop this in synonymy to *Plocamia manaarensis*, but the two forms are so very different from each other that this step seems hardly warranted. *Penneyi* may also be compared to the species which Schmidt (1870, p. 63) described as *Plocamia clopetaria*, especially because it also is a West Indian form; it probably should be transferred to the genus *Plocamione* or to *Raspeloplocamia*, which see below. *Clopetaria* has tylostyles with tuberculate heads where *penneyi* has smooth styles, entirely tuberculate thick styles where the latter has only basally spined thin styles, and *clopetaria* seems to lack the chelas. *Penneyi* is so-named in respect to Professor J. T. Penney, of the University of South Carolina.

SCOPE OF THE PLOCAMIINÆ

The typical genus of this family, as mentioned above, is *Plocamia* Schmidt. It has ectosomal monacts, endosomal smooth tylotes, toxas and palmate isochelas. Its genotype, *P. gymnazusa* Schmidt (1870, p. 62) is West Indian. *Lissoplocamia* Brøndsted is very closely related, but does not have chelas. There is another group differing from the above chiefly in not having any microscleres at all, represented by four species ordinarily referred to the genus *Echinochalina*. I propose for them the new generic name *Tablis*, and designate as genotype *Echinochalina anomala* Hallmann (1912, p. 292). Other species that would appear to be referable here include *Spongia clavosa* Lamarck (1814, p. 373), *Echinoclathria glabra* Ridley and Dendy (1886, p. 476), and *Echinochalina reticulata* Whitelegge (1907, p. 506). The genotype and the last two of these are characterized by a peculiar honeycomb architecture, and it is very possible that with suitable preservation *clavosa* would show the same structure, in which case it should be mentioned as one of the generic characteristics. Another genus might well be established for (genotype) *Reniera megarrhaphea* Lendenfeld (1888, p. 79), which is not even certainly of the family Plocamiidæ. Its principal spicules are oxeas, whereas most of the other Plocamiidæ have strongyles or tylotes. Lendenfeld does not mention any microscleres. The possibility must be further considered that his description in general may be unreliable. As a generic name for this rather dubious group I propose *Tumata*.

The group of genera, which like *Holoplocamia* mentioned above, are characterized by having spiny principal spicules, perhaps includes *Antho* Gray, a perplexing but interesting genus. Burton in 1930 (pp. 501 and 533) showed that the species *morisca*, the type of *Dictyoclathria*, belonged in *Antho*, and therefore it is to be noted the genus *Dictyoclathria* must fall in synonymy to that genus; also *Spongia dichotima* Linné (1767, p. 1299), which has been referred to *Dictyoclathria* by Burton (1930, p. 501) and by Topsent (1920, p. 19), must also belong in *Antho*. Furthermore the various species which Burton (1933, p. 505) drops in synonymy to the species *dichotima* must also belong here. It might be useful in this connection to give a list of the species names, many of them synonyms of each other, that are referable to this genus. In addition to the two species already mentioned, therefore, the following seven species need to be transferred to *Antho: Dictyocylindrus abyssorum* Carter (1876, p. 232), *Myxilla banyulensis* Topsent (1893, p. XXIII), *Isodictya beanii* Bowerbank (1866, p. 334), *Clathria gradalis* Topsent (1925, p. 651), *Artemisina mediterranea* Babić (1921, p. 87), *Raspailia moebii* Schmidt (1875, p. 120) and *Artemisina paradoxa* Babić (1921, p. 87). This genus was established by Gray (1867, p. 524), genotype *Myxilla involvens* Schmidt (1864, p. 37), and therefore antedates *Plocamia* of Schmidt (1870, p. 62) by three years. It is not typical of the family, however, because a very large fraction of the principal spicules are monactinal. It has smooth or slightly spiny auxiliary or dermal spicules over a main skeleton of megascleres that vary from acanthostyles to acanthostrongyles. As Burton (1930, p. 533) shows, there are palmate chelas and toxas for microscleres, not mentioned by Schmidt. *Antho* may be very closely compared to *Isociona* (see below) of the Microcionidæ. It is conceivable that the acanthostrongyles of *Antho* are not genuine but merely deformed acanthostyles, in which case *Isociona* should be dropped in synonymy to *Antho* and that genus transferred to the Microcionidæ. This step is not now recommended, but its possibility explains the decision not to employ this earlier genus as type of the family now under discussion.

The typical genera of Plocamiidæ with spiny principal spicules are as follows: *Axoplocamia* Burton has ectosomal spicules sometimes spined, therefore it approaches the genus *Crella*. The endosomal spicules are spiny strongyles. There seem to be no microscleres. This genus is exceedingly close to *Plocamione*, which see. *Lithoplocamia* Dendy has principal acanthostrongyles, auxiliary smooth tylostyles, no microscleres, and has a peculiar external appearance, somewhat like that of many lithistid sponges. *Paracornulum* Hallmann perhaps should be in the subfamily Crellinæ if some of its auxiliary spicules, all of which are spiny, be regarded as dermal; chiefly they seem to be echinating. They vary from acanthostyles to acanthostrongyles. The main skeleton consists of tylotes somewhat spined on the ends, in this respect being scarcely different from *Plocamia* itself. The microscleres are toxas and palmate chelas. *Plocamiancora* Topsent has smooth oxeas, acanthostrongyles, acanthostyles and anchorate chelas. *Plocamionida* Topsent has acanthotylotes, acanthostyles and smooth tylostyles, its chelas are arcuate; the type of this genus should be designated as *Microciona ambigua* Bowerbank (1866, p. 136) and two species that should be transferred to it are *Plocamia igzo* de Laubenfels (1932, p. 102) and *P. gaussiana* Hentschel (1914, p. 120). *Plocamiopsis* Topsent has amazingly queer anisochelas. *Plocamione* Topsent has the very simple spiculation of only main acanthostrongyles and supplementary smooth styles. *Plocamia clopetaria* Schmidt (1870, p. 63) is by Burton (1935, p. 402) made genotype of a new genus *Raspeloplocamia,* to receive also *Dirrhopalum carteri* Duncan (1881, p. 488) and *D. hystrix* Duncan (1881, p. 491) I have not yet had data for evaluation of Burton's decision. These three species seem to me very much like those belonging in *Plocamione.*

There are some other very puzzling genera which quite likely belong in the family Plocamionidæ, but they are not typical. These include *Acanthoxa* Hentschel, which has both monactinal and diactinal spiny spicules in its principal skeleton, and smooth monactinal auxiliaries. *Aulenella* Burton and Rao seems to have no principal spicules at all. Its spiny diacts and nearly smooth monacts seem both to be secondary. Like the new genus *Tablis* it has a rather honeycombed architecture, but it has palmate isochelas as microscleres. With these two should be placed a third genus for (genotype) *Grayella spinulata* Hentschel (1911, p. 340), the principal spicules of which are spiny oxeas, associated with which are smooth pseudostyles that are perhaps merely inequiended oxeas. The microscleres are arcuate chelas. For this I propose the genus name *Tisrone* and leave it in Plocamiidæ, largely for lack of a better location.

Other generic names to be considered here include *Dictyoclathria* Topsent, which as shown above, is a synonym of *Antho,* and *Dirrhopalum* Ridley which is a synonym of *Plocamia,* as is also *Heteroclathria* Topsent. *Plocamissa* Burton appears to be a synonym of *Plocamionida,* but warrants further study. Its type is *Plocamia igzo* de Laubenfels, above referred to. Burton considers this Myxillid.

Crellinæ Hentschel

This subfamily differs from Plocamiidæ proper in having the special auxiliary dermal spicules spined. Hentschel employed Crellidæ as of full family rank, in a much more comprehensive way than here used for the Crellinæ; see the remarks above on the topic of the Crellininæ. It would seem that this subfamily is not represented by any West Indian species so far recorded.

Scope of the Subfamily

As in the case of the Crellininæ, this group may be divided into four sub-headings with regard to whether or not echinating spicules are present and whether or not chelas are present. When they are to be found, they are normally arcuate. The first genus is the one having no echinating spicules, nor chelas; this is *Crella* Gray. The second and by far the largest genus in this subfamily is represented by a large group of species usually referred to the genus *Yvesia,* but differing sharply from the type of that genus, *Halichondria albula* Bowerbank (1866, p. 268), which has monactinal principal spicules. For this group with diactinal principal spicules I propose a new name, *Yvesiella,* and suggest as genotype, *Cometella pyrula* Carter (1876, p. 388). To this genus should be referred *Reniera membranacea* Hansen (1885, p. 3) and two species described first as of the genus *Grayella,* namely *crassa* Hentschel (1914, p. 95) and *schottländeri Arndt* (1913, p. 116). Numerous forms first described as of the genus *Yvesia* include the following: *hanseni* Topsent (1890, p. 30), *richardi* Topsent (1890, p. 31), *commensalis* Whitelegge (1906, p. 483), *pertusa*

Topsent (1890, p. 31), *pedunculata* Topsent (1890, p. 30), *fallax* Topsent (1890, p. 31), *rosea* Topsent (1893, p. XXIII), *lobata* Arnesen (1903, p. 18), *linguifera* Topsent (1890, p. 30). This group does not have echinating spicules, but does have chelas. Those with echinating spicules, but without chelas are represented only by *Crella donsi* Burton (1931, p. 136), and dubiously by *Yvesia dispar* Topsent (1927, p. 10). For this group, with *Crella donsi* as genotype, I propose the new name *Crellinspira.* The fourth valid genus of the Crellinæ is *Pytheas* Topsent; this genus has both chelas and echinating spicules. A fifth name which needs to be considered here is *Cribrella* Schmidt, which is a synonym of *Crella.* See also remarks above in connection with the genus *Axoplocamia.*

ACARNIIDÆ new family

This admittedly rather unsatisfactory family is here established for a small group of genera, not too well known, but characterized by having all their spicules spiny; in fact, in many cases they are profusely spiny. These spicules may be all diactinal, or more commonly, partly diactinal, partly monactinal. It may or may not be clear that the monacts are auxiliary. Resemblance might be noted to the family Agelasidæ (some of which have only spiny spicules, but they are all echinating), or to the subfamily Crellinininæ of the Phorbasiidæ. In fact, it might be well argued that this group should be transferred either to one or another of those families, or partly to one and partly to the other. It may be that the resemblance to one another within this group is not fundamental and that it is polyphyletic. This family seems not to be represented in the West Indies.

Scope of the Family

The oldest genus of this group is *Acarnia* Gray, the spicules of which are strongyles to tylotes, very spiny. In *Ectyonopsis* Carter the principal spicules are acanthostrongyles but some are modified to be acanthostyles. *Metschnikowia* Grimm has spiny oxeas and some acanthostyles as spicules. *Sceptrintus* Topsent has a few somewhat spiny styles and two sizes of rhabds with their spines arranged nodally. This is strongly suggestive of the family Agelasidæ; in fact, it may even prove advisable to transfer *Sceptrintus* to the latter family. *Trachostylea* Topsent differs from *Metschnikowia* chiefly in the somewhat axinellid architecture of the sponge. It may therefore be regarded as possibly congeneric, and on the other hand as possibly belonging to a very different family. There are four species which may be referred to this family Acarniidæ, for each of which a new genus seems to be necessary. I propose the generic designation *Janulum* for genotype *Isodictya spinispiculum* Carter (1876, p. 310). This has for spiculation only peculiar twice-bent strongyles, heavily spined in the middle, but not at the ends. It may be that *Reniera filholi* Topsent (1890, p. 65) might be referred also to this genus. I propose the new genus *Jelissima* for genotype *Hymedesmia tenuissima Thiele* (1905, p. 454). This has a spiculation of spiny oxeas and styles, with two sizes of peculiar quadridentate chelas and sigmas for microscleres. I propose the new genus *Jones* for genotype *Myxilla amaknakensis* Lambe (1894, p. 122). This has a spiculation of megascleres very like the preceding, but has arcuate isochelas of one kind only for microscleres. Finally I suggest the new genus *Julavis* for genotype *Tedania levis* Kirkpatrick (1900, p. 355), which has two distinct categories of spiny strongyles for megascleres and rhaphides for microscleres.

CYAMONIDÆ new family

This family is here established for a small group of genera which by their possession of spiny principal spicules seem to show close relationship with the Demospongia, but which by their possession of triactinal or tetractinal spicules seem to show relationship to the Choristida or Tetraxonid sponges. It is generally assumed, however, that this latter apparent relationship is not genuine, but that the triaxon or tetraxon spicules of the Cyamonidæ have been independently evolved from monaxon spicules by malformations. In addition to these spiny polyactinal spicules, there are present smooth principal spicules that are either monactinal or diactinal.

This family is represented in the West Indies by the type species of the type genus *Cyamon.*

CYAMON Gray

In this genus the principal spicules are smooth monactinals and the polyactinal auxiliary spicules usually have on them small spines only. The genotype (to be further discussed below) is West Indian, as is also a species described by Arndt (1928, p. 149) as a variety *toxifera* of the genotype. It is hereby proposed that this be elevated to full specific rank.

Cyamon vickersi (Bowerbank) Gray

This specimen was on a block of oolithic limestone dredged June 26, 1932, from a depth of 70 meters, southeast of Loggerhead Key.

It was an encrustation a little over 1 mm. thick and covered an area of 7 sq. cm. The color in life was very bright orange. The consistency is hard, only slightly elastic. The surface is minutely lumpy, microscopically hispid, and neither pores nor oscules can be made out. The main mass of this sponge contains a densely packed quantity of siliceous tetraxon spicules, each covered with low blunt spines, the ends rounded and more densely spined than the rest of the spicule. All four rays are approximately alike; representative sizes of these rays could be given as 5 by 40μ, 7 by 40μ, and 6 by 55μ. The rigidity and hardness of the encrustation comes from the interlacing of these tetraxons. Among them are a few sub-tylostyles, size about 13 by 877μ. There are long thin styles that echinate the surface, being perpendicular to it with their points out. Often more than half of each spicule protrudes. They vary in diameter from 2 to commonly 6μ, and are well over 2 mm. in total length, but so often broken that the maximum can not well be stated.

This specimen is identified here as conspecific with the genotype. The type of the genus *Cyamon* was described by Bowerbank (1864, p. 234) as *Dictyocylindrus vickersi,* a West Indian species. Gray (1867, p. 546) erected the genus *Cyamon* for it. Bowerbank's description is rather brief and not entirely satisfactory, but especially judging from the similarity in geographical location it may be assumed that the Dry Tortugas specimen is correctly identified as *vickersi.* Dendy (1921, p. 108) records a specimen from the Indian Ocean which he regards as conspecific, but it was violet to brown instead of yellow, and the tetraxon spicules were sharply pointed instead of being strongylote. It is therefore open to serious question that the two forms really are conspecific, and I therefore propose the new name *dendyi* for the Indian Ocean specimen.

Scope of the Family

Other than *Cyamon* the family Cyamonidæ is represented most conspicuously by the genus *Trikentrion* Ehlers, which differs from *Cyamon* in having diactinal instead of monactinal principal spicules. To this the genus *Achinoë* Gray might probably be added, but always with hesitation, because it is very poorly described. Even more hesitation is expressed in connection with the surmise that *Solina* Gray should be put in this family. *Plectronella* Sollas is a synonym of *Trikentrion*.

ASTROSCLERIDÆ Lister

The genera placed here have seemingly lost their principal skeleton entirely and have only auxiliary spicules left. These are numerous. If the principal spicules had been monacts, the group would have belonged in the Microcioniformes, but in the absence of all evidence it is as plausible to guess that they may have been diactinal. The principal skeleton is replaced here by masses of calcareous stuff in the form of cells like those of a honeycomb. In one case it is known that symbiont algæ erect this structure, and perhaps such is always the case. The group is not yet recorded from the West Indian region.

Scope of the Family

Astrosclera was described by Lister (1900, p. 459) for the one species *willeyana*. The external shape and size is that of a very small mushroom. The structure is basically nearly solid calcareous stuff made of agglomerated astrose clusters of aragonite crystals, the whole permeated by numerous ascending tubular hollows in which the sponge tissues occur. The spicules are exclusively echinating acanthostyles. The calcareous skeleton may be the production of symbiont algæ. Comparison should be made to *Merlia* of the Ophlitaspongiidæ.

TREMAULIDIIDÆ new family

This family is hereby established for the one genus *Tremaulidium* Schmidt, a lithisted sponge which has, in addition to the numerous desmas, tylotes slightly spined at each end and tylostyles with the heads slightly spined. These latter sorts of spicules bear very close relationship to many found in species of the family Plocamiidæ and the assumption is therefore here made that this represents sponges fundamentally related to the Plocamiidæ, which have acquired the lithistid modification.

MYXILLIFORMES

This artificial group is employed for the families Myxillidæ, Tedaniidæ, Raspailiidæ, Psammascidæ and Amphibleptulidæ. The last mentioned is provided for genera of lithisted sponges that by inference are considered as being more closely related to the other families mentioned above (in this paragraph) than they are to other lithistid varieties. The next to the last is a family that may be polyphyletic, comprising as it does genera about which relatively little is known other than that their skeletons consist almost entirely of sand and other foreign detritus. The Raspailiidæ are remarkable chiefly for their peculiar bodily form rather than for their spiculation. The really typical families of this artificial group are the Tedaniidæ and the Myxillidæ. These each have ectosomal diacts over endosomal monacts; the only basis of separation being that in the former there are no spiny spicules such as abound in the latter. There are so many intermediate conditions that this must certainly be regarded as a very finely drawn distinction. Many species, for example, have predominantly smooth megascleres, with a few here and there slightly or incipiently spined. It is a "toss-up" for choice as to which family should receive them. Topsent (1928, p. 71) uses Tedaniinæ and Myxillinæ as merely subfamilies of the family Myxillidæ, and perhaps this is the best taxonomic procedure. On the other hand, Hentschel (1923, p. 406) employs separate families for them and Ridley and Dendy (1887, p. LVIII) put *Tedania* in their family Heterorrhaphidæ along with many other genera here treated as of the family Adociidæ (Phorbasiformes), whereas *Myxilla* was put in their family Desmacidonidæ simultaneously close to *Plocamia* and genera here assigned to the Microcionidæ. In spite of the fact that the two groups are very closely related, with numerous intermediates, it seems advisable to separate them merely because it is convenient. The Myxilliform type of sponge is abundant and plastic. A very large number of distinctly different genera may be recognized, all having the basic plan of diacts over monacts. Because of the very abundance of genera involved, some sort of subdivision appears desirable. See also the remarks below in connection with comparisons between the Microcionidæ and the Ophlitaspongiidæ. In *Acarnus* of the Tedaniidæ we find perhaps the greatest variety of spicule sorts all in the same individual that is known in the phylum. In one sense of the word the Myxillidæ and Tedaniidæ represent a climax in sponge development, some others being simpler because they have not yet developed so greatly, others perhaps simpler due to loss of characteristics. Relationship to the following artificial group is close; let the dermal spicules be inequiended, *i.e.* monactinal, and the sponge would be Microcioniform.

MYXILLIDÆ Hentschel

This family is partially diagnosed in connection with the above discussion as to the artificial group Myxilliformes. The genera of this family seldom have large quantities of spongin or conspicuously reticulate structure. Often masses of principal spicules are packed together in tracts or as isodictyal reticulations; often they surround small chambers of canals in palisades. The dermal spicules are usually very different from those of the endosome, but it is difficult, sometimes impossible, to discriminate between echinating and so-called coring spicules, because of the above-described architecture. From the very similar family Tedaniidæ, the Myxillidæ differ in having distinctly spiny principal spicules.

It is suggested that the Myxillidæ be divided into two subfamilies, the Myxillinæ (comprising the bulk of the genera) in which the ectosomal spicules are predominantly or entirely smooth, and the Grayellinæ (otherwise very similar) in which the ectosomal spicules are predominantly or entirely spiny. The Myxillinæ that occur near the Dry Tortugas will be considered first.

The Myxillinæ proper are again divided into two artificial subdivisions, probably not to be regarded as subfamilies, with this distinction, that in the one the sponges are massive or extend to a considerable distance vertically, whereas in the second the sponges are uniformly very thin encrusting forms. This second group has been made a family, the Hymedesmidæ, by Topsent (1928, p. 54), but there are several reasons for regarding it as not a very satisfactory family group. For one thing, there is the difficulty of drawing the line between encrusting and massive forms, inasmuch as intermediates are very common. For another, there is the fact that at least some of the encrusting forms may merely be juveniles of those which later become massive, though it is hardly justified to assume that all are such, in view of the evidence that very numerous species remain encrusting regardless of environmental conditions and the time that elapses. A more important reason for doubting the validity of this as a family is that each of the genera assigned to it has as its closest relative not any one of the others assigned to the subgroup, but instead some genus assigned to the alternative subgroup. For example the encrusting *Astylinifer* relates

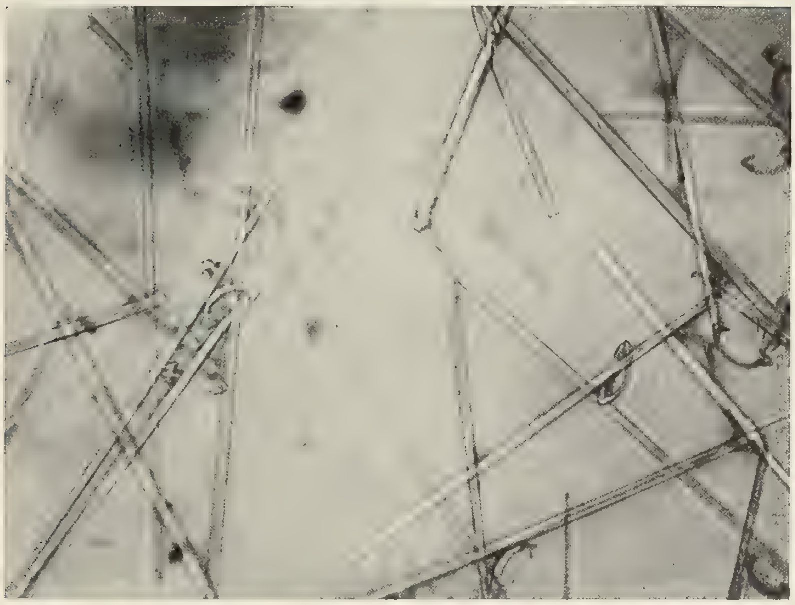


Fig. 1

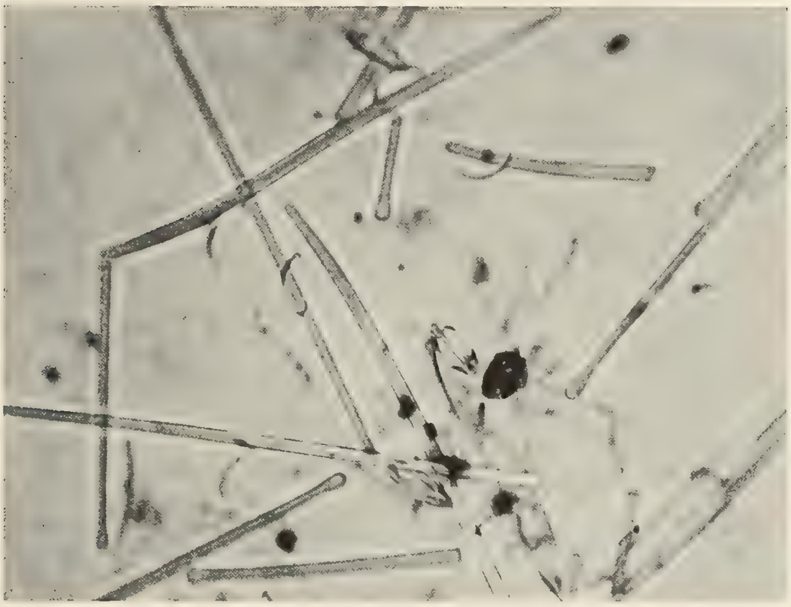


Fig. 2

Photomicrographs of isolated spicules, x 350. Figure 1, *Merriamium tortugasensis*. Most of the megascleres are broken ectosomal tornotes. In the upper central region one of the endosomal acanthostyles appears. Many arcuate chelas are scattered about. Figure 2, *Lissodendoryx isodictyalis*, x 350. Ends of ectosomal tylotes show. Near the center are two of the endosomal styles. A few of the arcuate chelas show plainly, and some sigmas that are slightly out of focus.

to the massive *Acheliderma*, the encrusting *Spirorhabdia* to the massive *Allantella*, and the encrusting *Stylopus* relates to the massive *Myxodoryx*.

To judge from the published descriptions, sponges belonging to the Myxillidæ are relatively rare in the West Indian regions. I have found at least two species in the vicinity of the Dry Tortugas, however.

Myxillinæ, Part I

MERRIAMIUM new genus

This group has the characteristic dermal diacts and endosomal more or less spiny monactinal spicules of the family Myxillidæ, accompanied by microscleres of only one sort, arcuate chelas. If there were sigmas present, which I can not find to be the case at present, this would be like the genus *Ectyodoryx* to be discussed below. If the chelas were anchorate instead of arcuiferate, it would be of the genus *Myxilla*. If in addition to sigmas being present, it were also a very thinly encrusting form, it would belong to the genus *Hymedesmia*. In the absence of any of these diagnostic points, it appears advisable here to establish a new genus; the genotype is designated as being the one species, *Merriamium tortugasensis*, to be described below. The generic name is given in respect to the eminent scientist, President John C. Merriam of the Carnegie Institution of Washington.

The following other species need to be transferred to this new genus; that which was first described as *Hymeniacidon paupertas* by Bowerbank (1866, p. 223); that first described as *Esperia sophia* by Fristedt (1887, p. 451); and that described as *Esperella clavigera* by Levinsen (1887, p. 360); two species first described as of the genus *Ectyodoryx*, namely *atlanticus* of Stephens (1916, p. 238), and *maculatus* of Hentschel (1911, p. 342); three species first described as of the genus *Dendoryx*, namely *certa* of Topsent (1892, p. 99), *ramilobosa* of Topsent (1916, p. 167), and *mollis* of Lindgren (1897, p. 482), but since there also was a *Dendoryx mollis* previously named by Ridley and Dendy (1886, p. 471), a new name is necessary for that of Lindgren. It is therefore here proposed that it be known as *lindgreni*. Finally there are four species originally described as of the genus *Lissodendoryx* that should be transferred here. They are *buchani* Topsent (1913, p. 626), *kyma* de Laubenfels (1930, p. 27), *lobosa* Lundbeck (1905, p. 154), *lundbecki* Topsent (1913, p. 41), and *styloderma* Hentschel (1914, p. 101).

Merriamium tortugasensis new species

Plate 11, fig. 1.

This species was first dredged on July 6, 1928, south of Loggerhead Key at a depth of 36 meters. The holotype, U. S. Nat. Mus. Cat. No. 22418, was dredged on June 23, 1932, east of Loggerhead Key at a depth of 17 meters.

It is an irregular mass 4 by 7 cm. with lumps about 2 cm. in diameter, but with all the contours well rounded. In life the color was a rich red, which still shows in places after some weeks in alcohol, but then later fades to gray of varying shades. The consistency is softly spongy. There are a few oscules between 2 and 4 mm. in diameter. The entire surface of the sponge is covered with poresieves 1.5 to 2.8 mm. in diameter and roughly circular in outline. Each of these poresieves overlies a subdermal cavity of comparable dimensions and is perforated with numerous openings (perhaps to be termed the pores) about 20μ in diameter each and 40μ apart from center to center. These pore areas in places are so crowded that they almost or quite touch each other, but again in other regions they are 2 to 6 mm. apart. The dermis between the pore areas is detachable, about 35μ thick, smooth, and full of tangentially arranged tornote spicules. These frequently lie parallel, making rafts or bundles. The endosome contains some coarse fragments of foreign material 1 to 2 mm. in diameter and is permeated by tracts some 100μ in diameter; these contain rows of spicules and also much foreign material in particles from 30 to 60μ in diameter. There are very numerous spicules loose in the flesh. The most abundant megascleres seem to be the hastately pointed tornotes, one end rather larger than the other, variable in size but often about 4 by 285μ. This, as is to be expected of a dermal spicule, is the only one found at the surface, but as is rather frequently the case with the so-called auxiliary dermal spicules is also found interstitially; it is astonishing to note it further occurring also in the tracts, at least near the surface of the sponge. The other sort of spicule is an acanthostyle about 5 by 180μ; it is found placed rather irregularly in the fibers, especially near the basal part of the sponge. There are exceedingly abundant arcuate isochelas 22μ in length. In the specimen collected in 1928 occur similar microscleres, although a very considerable minority of the chelas have a spine or prong, 3μ long, situated on the shaft about midway between the two ends.

It is this last item almost exclusively that distinguishes this species from the other eight referred to this genus. The microscleres differ notably, but the megascleres of all are commonplace for the genus and family.

Scope of the Myxillinæ, Part I

The genera of the subdivision of the Myxillidæ established for sponges that are massive instead of merely thinly encrusting have very similar spiculation as to megascleres and can not readily be differentiated one from the other on that basis, but instead may be recognized with more or less ease on the basis of presence or absence of certain types of microscleres. *Acheliderma* Topsent has rhaphides and toxas, otherwise resembling *Astylinifer*, but being massive instead of thin. *Allantella* Hallmann has rhaphides and peculiar spiny microrhabds somewhat like the encrusting genus *Spirorhabdia*. *Allocia* Hallmann has as microscleres only palmate chelas, but those of two sizes. *Anomolissa* de Laubenfels has as microscleres spicules that seem to be very greatly malformed arcuate chelas. The ectosomal megascleres are erect oxeas. The one species, *A. amaza* de Laubenfels (1934, p. 17), is West Indian. *Chætodoryx* Topsent has arcuate isochelas with spiny microrhabds. *Dolichacantha* Hentschel has palmate chelas, large sigmas, and is also peculiar for the very long spines on some of the megascleres, in this respect bearing some resemblance to certain of the spicules of *Acarnus*. *Ectyodoryx* Lundbeck has arcuate isochelas and sigmas and may be compared to the encrusting genus *Hymedesmia*. To *Ectyodoryx* should be transferred the sponge originally described as *Dendoryx nodaspera* by Topsent (1913, p. 623) and three species first described as of the genus *Myxilla*, namely *crelloides* of Brøndsted (1924, p. 468), *lundbecki* of Breitfuss (1912, p. 67), and *parasitica* of Lambe (1893, p. 31); also three species first described as of the genus *Stylostichon*, namely *fibulatus* of Topsent (1894, p. XLII), *involutum* of Kirkpatrick (1903, p. 250), and *repens* of Topsent (1904, p. 170). *Ectyomyxilla* Lundbeck has as microscleres only anchorate isochelas. It should have understood as its genotype *Ectyomyxilla kerguelensis* of Hentschel (1914, p. 103). *Iophon* Gray has as microscleres the bipocilli and the peculiar type of an isochela always associated with bipocilli. This association is probably not mere coincidence, but may be taken as an indication that it happened as a manifestation of a certain physiological state. The obvious chelas are certainly modified from the ordinary forms and the bipocilli are possibly to be interpreted as merely further deformed chelas. Such combination of much and little deformed anisochelas occurs not only in the Myxillidæ but also in the Phorbasidæ, described above (see the genus *Iophonota*). *Kirkpatrickia* Topsent, like the later genus *Myxodoryx*, has no microscleres and differs from *Myxodoryx* only in having peculiar pore areas. *Kowalewskyella* Swartschewsky is set apart for having a basal horizontal layer of acanthoxeas; it also has no microscleres. A new genus, *Myxichela*, is here established to have as genotype *Lissodendoryx tawiensis* Wilson (1925, p. 432), for a genus of sponges which is very like *Leptoclathria* except massive instead of thinly encrusting. The microscleres consist of palmate isochelas and toxas. *Myxilla* Schmidt has anchorate isochelas and sigmas. It is generally understood that its genotype is *Halichondria rosacea* of Lieberkühn (1859, p. 520?), but since it is not clear that this has ever been definitely established, let it be so established now. *Myxodoryx* of Burton has no microscleres, and as mentioned above differs from the earlier *Kirkpatrickia* largely by the lack of the peculiar pore areas. It is very like the thinly encrusting genus *Stylopus*, except for the habitus. *Trachyforcepia* Topsent has arcuate isochelas, sigmas and forceps, resembling the encrusting genus *Leptolabis*. *Zetekopsis*, new genus, is here established for genotype *Hastatus indistinctus* Fristedt (1887, p. 444), a sponge having dermal strongyles, endosomal styles that are in some cases spiny and in other cases smooth. There are commonplace sigmas, sigmas with very long spines, and peculiar arcuate chelas. This genus is so named in respect to the eminent zoologist, Dr. James Zetek of the Panama Canal Zone.

In addition to the generic names discussed above there are others which are to be regarded as synonyms either of *Iophon* or of *Myxilla*. The following genera are well known to be synonyms of *Iophon: Alebion* Gray, *Burtonella* de Laubenfels, *Iophonopsis* Dendy, *Menyllus* Gray and *Pocillon* Topsent. Similarly the following are known to be synonyms of *Myxilla: Dendoryx* Gray, *Emplocus* Gray, *Hastatus* Vosmaer, *Sclerilla* Schmidt, *Stegxella* Bowerbank and *Tereus* Gray. *Stegxella* is probably now for the first time advertised as being a synonym. The genotype of *Hastatus* needs to be understood as being *Isodictya lurida* Bowerbank (1866, p. 336).

Myxillinæ, Part II

HYMEDESMIA Bowerbank

This genus may be taken as the most typical of the thinly encrusting division of the Myxillidæ. There are smooth dermal diacts and more or less spiny monactinal main spicules and microscleres comprising arcuate isochelas and sigmas. This spiculation, as noted above, is very like that of *Ectyodoryx*, and it may well be that a few of the specimens described as of the genus *Hymedesmia* may really be juveniles, which when mature would have been classified as in *Ectyodoryx*. In this connection it is well to note that specimens of *Hymedesmia* are relatively abundant in contrast to the exceeding rarity of specimens identified as *Ectyodoryx*. It scarcely seems likely that where the juveniles are so abundant, adults would be so rare. Furthermore, as Burton has shown, the tangential placement of the dermal spicules is a characteristic of an immature sponge, whereas the erect placement comes on with age and is an indication of maturity. In the specimens of *Hymedesmia*, as for instance that about to be described, the erect position is found so frequently that we may assume from that as evidence that they really are mature. Nevertheless, as indicated above, it must be kept in mind that immature specimens of *Ectyodoryx* would be practically indistinguishable from *Hymedesmia*, and an unknown number of the species of this latter genus are wrongly classified at present.

There are three species at present left in the genus *Leptosia* which rather clearly do not belong there, but each of them is difficult to allocate and it is with great hesitation that they are here tentatively transferred to *Hymedesmia.* All three are originally described by Topsent, *lancifera* in 1906 (p. 560), *manubriata* and *triungulata* in 1928 (p. 271).

Hymedesmia nummota new species

The holotype of this species, U. S. Nat. Mus. Cat. No. 22519, was dredged July 30, 1932, at a depth of 1047 meters in the Gulf Stream about halfway between the Dry Tortugas and Cuba.

It is an encrustation on dead coral and varies from 0.5 to 2 mm. in thickness, covering an area of about 2 sq. cm. The color is very pale gray. The consistency is mediocre. The surface is microscopically irregularly lumpy, otherwise smooth, not hispid. The oscules and pores are not evident, but mention must be made of a structure found in one of my microscopic preparations of this sponge. There is a tube 300μ in diameter, with walls 65μ thick, rising from the surface of the sponge a distance of 1.6 mm. This is possibly an efferent opening. Its walls are densely packed with the special dermal spicules, longitudinally placed in the layer, and many of the microscleres protrude from the outer surface as is true in general of this sponge. The ectosomal specialization consists of a dense mass of strongyles almost all vertically placed, and not tangental. In order to include these spicules so placed, the thickness of the dermis is about the length of one of the strongyles. At the very base of the sponge is a layer of spongin that was in contact with the substratum. This is about 100μ or more thick, and in it the spiny heads of the endosomal spicules are embedded. They rise from it, but seldom perpendicularly, usually at all angles, and many seem to be loose in the flesh, strewn in confusion.

The abundant spicule is a tylostyle with the head very spiny and having also a few spines on the shaft near the head; representative sizes are 18 by 970μ, 20 by 1130μ, and 21 by 1240μ, the second size mentioned is perhaps the more common. There are a very few small completely spiny acanthostyles about 10 by 620μ; these perhaps represent a second category that may be regarded as echinating but it is not clear that such is the case. The dermal spicules are smooth strongyles commonly 7 by 485μ but varying from at least 6 by 470μ to 8 by 565μ. The microscleres are arcuate isochelas with very wide shafts that are much curved, the length of chord in each being 44 to 63μ, commonly about 50μ.

Of the very numerous other *Hymedesmias*, this is perhaps closest to *nummulus* of Lundbeck (1910, p. 55), an Arctic species; it differs in that the chelas of *nummulus* have large lateral alæ and are rather smaller; the larger styles are more acanthose in *nummulus* also.

SCOPE OF THE MYXILLINÆ, PART II

The genera of the subdivision of the family Myxillidæ, which are set apart for thin habitus, have very similar spiculation as to megascleres in comparison to one another and to the sponges of the other subdivision. As mentioned above, the ectosomal spicules are diactinal while the endosomal ones are monacts, more or less spiny. The differences in the microscleres are worthy of comment. *Acanthancora* Topsent has two peculiar sorts of microsclere, each perhaps to be regarded as being a greatly modified arcuate chela; the one is like a sigma with three prongs at each end and the other is like a sigma much given over to spines on the convex side only. *Acanthorhabdus* Burton has peculiar megascleres in that there are what appear to be oxeas modified into styles by stair steps at one end. These may have been styles to begin with. There are also spiny diactinal spicules. The microscleres are peculiar anisochelas. In general this is a very remarkable genus and its systematic position is by no means certain. *Astylinifer* Topsent has rhaphides and toxas, somewhat resembling the massive genus *Acheliderma.* *Chiastosia* Topsent has odd-shaped unguiferate isochelas and very unusual microscleres of a type which Topsent terms "chiastosigmas." Each spicule resembles two sigmas with strongylote ends, each attached at the middle to the other. *Clinolabis* Topsent has anchorate isochelas, sigmas and forceps, and should be compared to the two genera to be mentioned below, *Leptolabis* and *Myxillabis.* A new genus, *Ferrerhernándezia,* is here established for genotype *Hymedesmia ænigma* Lundbeck (1910, p. 84), to which should be added rather dubiously the sponge originally described as *Desmacidon crux* by Schmidt (1875, p. 118). The spiculation comprises dermal diacts that are frequently polytylote. The endosomal monacts are spiny and the microscleres are weird asteroid chelas. The genus is so named in respect to the eminent zoologist, Professor Francisco Ferrer Hernández of Madrid. *Holorodesmia* is here elevated to generic rank; it was proposed as a subgenus by Topsent (1928, p. 267). It also has polytylote dermal spicules, but the microscleres are palmate isochelas. The genotype should be understood as being *Hymedesmia flaccida* of Topsent (1928, p. 267). To this genus should be added also *Hymedesmia palmatichela* of Topsent (1928, p. 269) and *Hymedesmia polita* of Ridley (1881, p. 121). *Hymenamphiastra* de Laubenfels has microscleres that are perhaps to be regarded as fundamentally birotulate, but have a pronounced desmoid type of modification. It may otherwise be compared to *Hymetrochota* which is mentioned below. *Hymenancora* of Lundbeck has only anchorate chelas with many teeth. Its type should be understood as being *Leptosia umbellifera* Topsent (1904, p. 192). *Hymenotrocha* of Burton has both arcuate and anchorate chelas, as well as birotulates of two sizes, which wealth of microsclere spiculation separates it distinctly from the otherwise similar *Hymetrochota* of Topsent, which will be mentioned below. *Hymesigmia* of Topsent has only sigmas as microscleres. It should receive *Hymedesmia tenuisigma* of Lundbeck (1910, p. 100), *Hymedesmia pilata* of Bowerbank (1882, p. 59), and *Leptosia simplicissima* of Hentschel (1911, p. 359). *Hymetrochota* of Topsent has birotules of one size only, but not with the desmoid modification characteristic of the above-mentioned *Hymenamphiastra.* *Iotroata,* new genus, is here proposed for genotype *Iotrochota acanthostylifer* Stephens (1916, p. 236). This genus is characterized by having anchorate isochelas usually with more than three teeth and also birotules of one size. Two other species originally described as of the genus *Iotrochota* should be transferred to this new genus. They are *dubia* of Lundbeck (1905, p. 189) and *spinosa* of Lundbeck (1905, p. 195). *Leptoclathria* of Topsent has palmate isochelas and toxas, thus resembling the above-mentioned genus *Myxichela,* which is, however, massive. *Leptolabis* Topsent has arcuate isochelas, sigmas and forceps. Were it massive, it would be very like the genus *Trachyforcepia.* *Marcusoldia* new genus is established for genotype *Leptolabis tenuissima* Hentschel (1911, p. 360), for sponges having palmate isochelas and forceps as microscleres. Another species which should be transferred to this new genus is *Leptolabis assimilis* of Lundbeck (1910, p. 122). The generic name is given in respect to Professor Marcus Old of Ursinus College. *Onychomyxilla* of Topsent has only unusual many-toothed unguiferate chelas as microscleres. *Pœcilochela* new genus is here established for genotype *Myxilla decepta* Kirkpatrick (1907, p. 278).

It is exceedingly remarkable to note that no less than three kinds of chelas occur in this one type of sponge. They are arcuate, anchorate or unguiferate, and a third curiously malformed sort, perhaps originally anchorate. Another species that should be transferred to this genus is that first described as *Hymedesmia mertoni* Hentschel (1912, p. 376). *Quixilla* new genus is here established for genotype and only species *Hymeraphis lacazii* Topsent (1891, p. 541). The dermal spicules have the hastate modification to the ends. There are a few tylostyles and spiny echinating styles for megascleres, with no microscleres present. *Spirorhabdia* Topsent has as microscleres only spiny rhabds, and one is tempted to query as to whether or not they are proper. They are most unusual in this family except in the genus *Allantella*, to which very interesting comparisons may be made, as it does illustrate a genus of almost indubitable Myxillidæ with spiny microrhabds. Furthermore, as noted above, in *Chætodoryx* the microrhabds are more or less spiny. *Stylopus* Fristedt, like *Quixilla*, has no microscleres, but has quite commonplace megascleres, very much like those of practically all the genera in the family Myxillidæ. It is very like the genus *Myxodoryx* except that it has the thinly encrusting form. *Hymeniacidon dujardini* of Bowerbank (1866, p. 224) should be transferred to *Stylopus*, as should also *Myxilla versicolor* of Topsent (1894, p. XLI), together with its subspecies. Four species originally described as of the genus *Leptosia* need to be transferred here. They include *acerata* of Topsent (1904, p. 193), *australiensis* of Hentschel (1911, p. 355), *obtusata* of Topsent (1904, p. 193), and *oculifera* of Hentschel (1911, p. 354). Finally there are no less than ten species, now described as in the genus *Hymedesmia*, which should be transferred here. There include *æquata* Lundbeck (1910, p. 106), *dermata* Lundbeck (1910, p. 107), *longurioides* Burton (1932, p. 327), *longurius* Lundbeck (1910, p. 105), *mucronella* Lundbeck (1910, p. 110), *parvispicula* Burton and Rao (1932, p. 351), *primitiva* Lundbeck (1910, p. 104), *pulchella* Bowerbank (1882, p. 61), *stevensi* Burton (1930, p. 494), and *tornotata* Lundbeck (1910, p. 109). The list of encrusting Myxillidæ concludes with the genus *Trachytedania* of Ridley which has as microscleres only smooth raphides.

Other generic names which need consideration here include two synonyms of *Stylopus*, namely, *Leptosia* Topsent and *Spanioplon* Topsent. The genotype of *Leptosia* needs to be understood as being *Hymeniacidon dujardini* Bowerbank (1866, p. 224). Finally, in this group, there are two generic names which are unrecognizably described; they are *Naviculina* Gray and *Suberotelites* Schmidt.

GRAYELLINÆ new subfamily

The genera in this group agree in many respects, such as general architecture and plan of spiculation, with those in the Myxillinæ, but differ in that the special dermal diacts are spiny instead of smooth. The endosomal spicules are monactinal.

Scope of the Subfamily

This division of the former family Crellidæ may be further split on the basis of types of microscleres and the presence or absence of echinating spicules. *Grayella* Carter has neither echinating megascleres nor chelas. In contrast, *Crellomyxilla* Dendy has both; the chelas are of two sorts and, while having rather sharp pointed clads, are nevertheless probably to be regarded as being arcuate. *Tethyspira* Topsent has echinating spicules, but no chelas. *Lissomyxilla* Hanitsch appears to be a complete synonym of *Tethyspira*.

TEDANIIDÆ Ridley and Dendy

This was used as a subfamily of the Heterorrhaphidæ by Ridley and Dendy (1887, p. LVIII), close to genera that are here placed in the Adociidæ, and quite distant from *Myxilla.* In contrast to this, Topsent (1928, p. 71) regarded *Tedania* and some related genera as a subfamily of his Myxillidæ. There is much to favor such a classification. Very numerous specimens of sponge with dermal diacts, especially those identified as of the genus *Lissodendoryx*, have monactinal principal spicules that are chiefly smooth but yet, here and there, have some megascleres provided with a few little spines. In spite of these intermediates, but with some misgivings, it is here suggested that family rank be employed for the Tedaniidæ. I am perhaps a little influenced by the judgment of Ridley and Dendy but even more by the fact that it seems convenient so to do.

The ectosomal spicules of the Tendaniidæ are very closely comparable to those of the Myxillidæ. The (smooth) endosomal spicules are perhaps a trifle more often organized into tracts or fibers. Two species of the family occur near the Dry Tortugas.

TEDANIA Gray

This genus, as might be expected, is characterized by having diactinal ecotosomal spicules over principal spicules that are styles. The microscleres are peculiar, so that they have been given a special name. At first glimpse they seem to be ordinary rhaphides, but with better magnification they are seen to be roughened all over, not spiny as is true of the acanthospicules, but with sharp little lumps. They are called onychætes. The type of the genus is *Reniera nigrescens* Schmidt (1862, p. 74). The genus is very widely distributed throughout the world, numerous specimens occurring in the Antarctic and in practically all oceans, very especially including the West Indian region.

Tedania ignis (Duchassaing and Michelotti) new combination

This species is exceedingly abundant in shallow water in the vicinity of the Dry Tortugas—it is quite possible that literally bushels of this sponge could be accumulated by a few hour's collecting. On the reefs east of Bird Key it occurs where it is almost out of water at low tide, and must therefore endure water and air temperature certainly very close to and perhaps above 40 degrees Centigrade. Since the red color absorbs heat more than is true of some others, at least the full force of the sun temperature is received, although a thermometer inserted in the oscule of this sponge failed to show a higher temperature than that of the surrounding water. To the human, at least, this species is very easily found, as the brilliant color is very conspicuous against the background of white coral sand. One would suspect therefore that the brightness was a protective or warning coloration. This is not borne out by the fact that the examination of the stomachs of many fishes occurring in the vicinity revealed in several of them, particularly in the sorts called "angel fish," bits of this *Tedania*, but of practically no other sort of sponge.

The form is massive to amorphous, or encrusting, often over 15 cm. in diameter and up to 5 cm. in thickness. There seems to be no particular set form for the main mass of sponge except that which is dictated to it by the environment, but the surface architecture is quite characteristic. The digitate processes, which are merely enlarged oscular chimneys, have very commonly the same shape and approximately the same size, except in the small encrusting specimens that may be assumed to be juvenile. The color in life is a brilliant vermillion, the endosome much paler than the ectosome. This color is preserved to some extent in alcohol, but quickly fades to greenish white in the dried specimen. A great deal of attention has been paid in some discussions on the taxonomy of sponges as to the value of color in distinguishing one species from another. Out of literally thousands of specimens of *Tedania* in the vicinity of the Dry Tortugas, not the slighest trace of variation in color could be noticed with the naked eye, with one possible exception. On June 26, 1932, near Loggerhead Key, three *Tedania* specimens were found close together, and all of them of peculiar color, between orange and pinkish brown. The hypothesis is set forth here with very considerable confidence that these three were in some respect pathological or abnormal, perhaps as a result of some accident that had happened to them or of some influence in the immediate neighborhood. It is quite conceivable, for instance, that they were nearly dead, or in a dying condition, at the time of collection. The consistency is very soft and delicate, in life almost as fragile as wet tissue paper. When dry this species easily crumbles to powder. The surface is smooth, over low protrusions. The brighter red color changes gradually to the paler pink of the endosome throughout a zone 4 to 5 mm. thick. The dermis proper is only some 40μ thick and can not be readily removed. The oscules are typically about 5 mm. in diameter and frequently are elevated on the cone-shaped processes already discussed; these are usually about 1 cm. high and slightly less than that in diameter. It would seem that smaller ones are still growing. The architecture of the endosome simulates very closely the structure of well-risen bread. The spicules are strewn (otherwise in confusion) in the sheets of flesh that outline the subspherical gross chambers about 1 or 2 mm. in diameter. There are a few vague spicular tracts about 50μ in diameter. The special dermal spicules are tylotes 4 by 185μ, the distal extremities of the oval heads being faintly microspined. These are chiefly tangentially arranged in the dermis, but by no means always so. The endosomal megascleres are smooth styles 6 by 215μ. The microscleres are abundant oxea-like rhaphides 1 by 135μ. With the oil immersion lens they may be seen to have roughened surfaces. It is probable that with sufficient magnification slight roughness would be detected on almost any surface of any spicule, but the roughness present in this genus is characteristically much greater on the rhaphides than is true of other spicules in general.

This species was first described by Duchassaing and Michelotti (1864, p. 83), as *Thalysias ignis*. It was excellently redescribed by Wilson (1894, p. 320) as *Tedania brucei*, his use of that name in 1891 having been a nomen nudem. Wilson (1902, p. 395) referred the species to *Tedania digitata*, and Burton and Rao (1932, p. 353) refer it in synonymy to *nigrescens*. Other specimens of *Tedania* from almost all parts of the world, including the Red Sea, East Indies, Australian region, etc., are by these latter authors also considered conspecific with *Tedania nigrescens*. While meticulous comparison will disclose differences in the dimensions of the spicules of the various sponges involved, these differences are of so minute an order, that their value apart from other considerations must be regarded as inconsequential. Of all the characteristics at present noticed, only that of color may serve as a possibly valid means of distinguishing the West Indian form from those found in other parts of the world. It seems to me quite reasonable to assume that this is worthy of serious consideration. The genotype, *nigrescens*, is from the Mediterranean region. The published reports would seem to indicate that bright red sponges of *Tedania* are in that part of the world exceedingly rare or non-existent; *nigrescens* itself was nearly black, and the other Mediterranean forms which are almost certainly conspecific with it are typically greenish brown to black. In the Indian Ocean and Australasian region the *Tedanias* of this general spiculation are occasionally bright red, but not invariably so, other colors being rather often reported. In the West Indian region, where the form is enormously abundant, the uniformity of coloration is most noteworthy. Identical ancestry for all these *Tedanias* seems plausible, but it would appear that subsequent to distribution of what was originally one species, that the descendants in different parts of the world are proceeding with variation or evolution along somewhat different lines. For convenience in referring to them it seems to me advisable to have different names for these progressively varying races.

ACARNUS Gray

The principal skeleton of this genus consists of smooth, rather large styles, arranged in tracts that are almost Axinellid or plumose; the majority of the spicules have their points at an angle, but in general directed toward the surface of the sponge. This sort of spicule seems always to be the most numerous, and in some places constitutes the vast bulk of the megascleres, but all the other numerous varieties of spicule are diactinal. As interstitial spicules, particularly in species found near the Atlantic Ocean, there occasionally are a few very commonplace appearing smooth oxeas. In one of the Dry Tortugas specimens described below, however, there occurs that series of stair steps at one end of these supposed oxeas, which seems to indicate that the spicule is fundamentally a style, to the otherwise rounded head of which had occurred a series of more or less pathological modifications secondarily giving it the semblance of an oxea. The dermal spicules are tylotes with well-rounded heads approximately equal to each other. These may or may not have spines on them, but, if any, they are small. Usually near the surface there may occur another category of spicule, which, upon heating to bring out its internal structure, is shown to be basically like the dermal spicules but with other layers of silica added, so that the whole thing is about twice as thick; then at one end four rather large recurved clads are added. The superficial resemblance is to the anatriænes of the tetraxonid sponges, this being usually an anatetræne instead. Dendy and Ridley (1886, p. 155) used this as an argument for a theory afterward much advocated by Dendy that the monaxonid and tetraxonid sponges were very closely related. As pointed out previously (de Laubenfels, 1932, p. 106) in tetraxon spicules the clads have their axial canals connected to that of the rhabd, and in *Acarnus* there is no such connection, instead the structure is exactly like that of the Hexactinellid discohexasters and amphidiscs. Both in the West Indian region and in California, where I have found even more specimens of *Acarnus* than elsewhere, this "palm tree" type of spicule is rather often wanting, perhaps indicating that it does not appear until an advanced degree of maturity in the sponge. Against this may be cited the fact that the specimens possessing it do not average larger than those lacking it; note however, that younger sponges may because of favorable environment be larger than older sponges growing under difficulties. I am very confident that this spicule category represents a modification of the original dermal spicule.

The type of spicule probably most peculiar to *Acarnus* is also basically a tylote, but a great deal smaller than the dermal tylote and usually found rather deeply imbedded in the sponge, instead of near the surface. It is much more modified from the tylote sort than the type of spicule discussed immediately above. At each end, symmetrically placed, four additions to the tylote head are found; at one end these are recurved clads, making that end an anatetræne. At the other end of the four corresponding additions may be merely rounded lumps or the lumps may be sharpened into the shape of thorns which may curve, some one direction and some another. Along the shaft in between are structures shaped very much like the thorns on the stems of rose bushes; these all bend in the same direction as the clads already discussed. Here and there throughout the order Pœcilosclerina, the acanthose spicules have their spines so bent, but only in a few cases, as for instance the genus *Dolichacantha*, is the shape so symmetrical and pronounced. This spicule sort is so small that it may conceivably, but probably not correctly, be regarded as a microsclere. In addition there are as undoubted microscleses toxas of enormous variation in size and shape; some specimens of *Acarnus* have each practically every sort of toxa found anywhere else in the phylum Porifera. The size variation is so great that the larger ones are more than ten times as long as the shorter ones. Finally, there are palmate isochelas of the type very commonplace in the family Microcionidæ. These are very uniform as to length, which is about 15µ in all species of the genus. The "palm tree" type of spicule is certainly lost from what are undoubtedly specimens of the genus *Acarnus*, and this leads one to speculate as to the possibility of other spicule varieties being lost. By taking away this or that from the other sorts found in *Acarnus* there would be left spiculation characteristic of a very large fraction of all the genera assigned to the order Pœcilosclerina.

The type of the genus is specified as *innominatus* Gray (1867, p. 544) which was unrecognizably described, but it should be noticed that Carter (1871, p. 269) redescribed the actual specimen found in the British Museum from which Bowerbank (1864, fig. 292) prepared the illustration for which Gray (1867, p. 544) established the new genus and species *Acarnus innominatus*.

Fonteia Gray and *Trefortia* Dezsö are synonyms of *Acarnus*.

Acarnus innominatus Gray

Plate 12, fig. 2.

The specimen most carefully studied was collected June 6, 1928, growing among corals (chiefly dead) of the genus *Porites* on Bird Key Reef, where it is almost exposed at low tide. This species was found again in 1932 growing in shallow water west of Loggerhead Key, also on dead coral; one specimen was collected for study on July 17, 1932.

The shape is somewhat amorphous, always more or less massive, 1 to 3 cm. thick, 3 to 6 cm. in diameter in the specimens noted; undoubtedly smaller ones occur. The color in life was bright orange to red, paler in the interior. The consistency is somewhat compressible, perhaps to be termed mediocre. The surface is minutely tuberculate with the tubercules visible to the naked eye. Under the microscope each tubercule is seen to be strikingly hispid. There is a very delicate slimy or fleshy dermis about 22µ thick. The oscules are usually about 2 cm. or more apart and 2 to 3 mm. in diameter; they exhibit varying degrees of sphinctrate closure in each specimen. The brighter red cells extend down from about 100 to 300µ below the surface. In those places where they extend to the greater depths, in general the color is more red, and where they extend only to the lesser depth the color is more orange. One may say that only two colors occur, each in its place and the combination is quite specific. There is the golden pigment of the endosome and the scarlet typical of the ectosome. This latter permeates the sponge to a varying degree. I find oval flagellate chambers 40 by 60µ in dimensions. The endosome is basically somewhat "crumb-of-bread," conspicuously permeated by ascending plumose columns 100 to 175µ in diameter and 150 to 450µ apart, center to center. There is what appears to be spongin uniting the blunt ends of the smooth styles, of which the points are directed in general toward the surface. These tracts seldom branch and even more seldom anastomose, but are loosely con-

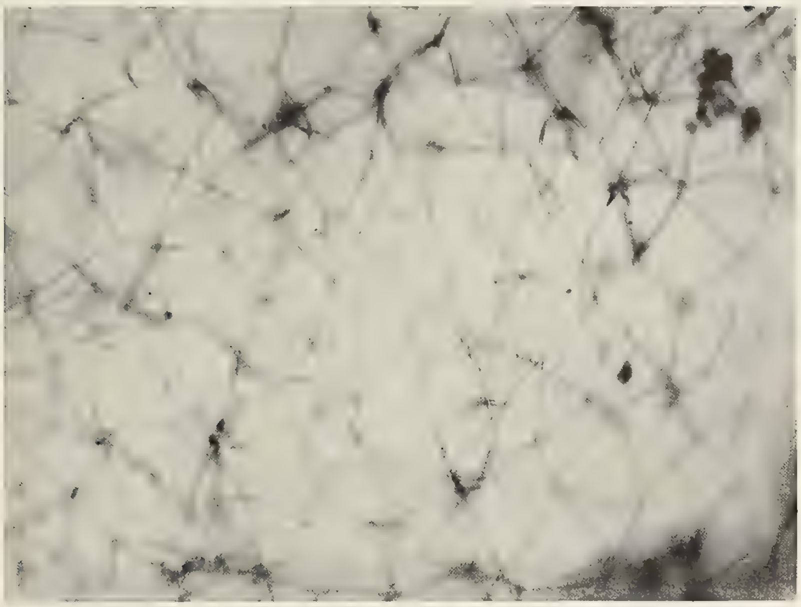


Fig. 1

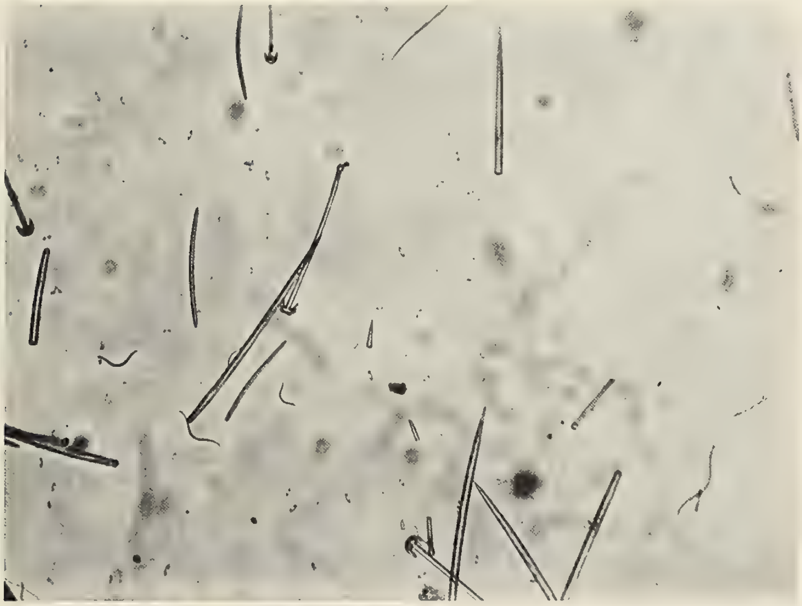


Fig. 2

Figure 1, *Adocia neens.* Photomicrograph of section cut tangent with surface, x 80. Note well-characterized "Reniered" or isodictyal reticulation. Figure 2, *Acarnus innominatus.* Photomicrograph of isolated spicules, x 80. Near center note entire cladotylote, portion of another at margin. One oxea shows near left center, and several styles, some of them broken. About fifty of the chelas show, and half a dozen toxas.

nected with each other by semifascicular bunches of spicules. These latter spicules (parallel to the surface) are in some cases styles or oxeas or the so-called "palm-trees." Spicules of this latter category are found just below the surface, their tylote ends imbedded in the tracts and the cladome ends projecting. The dermal tylotes are usually tangentially placed. The dermal tylotes are commonly 2 by 180µ with ten to twelve minute short spines on the distal extremities of each tylote swelling. The principal spicules are smooth styles 12 by 300µ to 13 by 280µ; this is the common size, but here and there occurs an occasional single spicule much larger, apparently exceptional. There are a very few oxeas present, each about 4 by 130µ. Some of these appear to be primarily styles, of which one end is modified by steps to resemble an oxea superficially. The palm tree-like spicules have shafts 6µ in diameter; the end imbedded in the tract is tylote, 8µ in diameter, and the recurved clads on the projecting end are 24µ long. The chord diameter is 22µ. A very small percentage of these spicules have five clads instead of four. The average length is about 200µ. The rose stem-like spicules have rhabds often about 2µ thick, the general swellings are 3 to 4µ in diameter and the recurved end-clads about 5µ long, chord diameter 7µ, total length of the spicule about 80µ. The palmate isochelas are from 12µ to usually 15µ in length. The toxas are from about 1 by 40 to 3 by 400µ in dimensions, some being once bent with straight protrusions, others are three times bent, some of the latter being very thick in the middle. There is a notable lack of uniformity of either size or shape, so that practically infinite variation is shown.

This species may be compared to *Acarnus erithacus* de Laubenfels (1927, p. 258), a Californian species with which I am very familiar. The Californian variety practically never has the oxeas, nor any of the orange color, and does have four symmetrical protrusions on the embedded ends of the "palm tree" type of spicules; its principal spicules (the styles) are much larger than in the West Indian form.

This species was described by Ridley (1884, p. 453) as *Acarnus carteri*, but of course Gray's name has priority. Both Gray's and Ridley's specimens were West Indian; it appears that this species does not occur elsewhere.

LISSODENDORYX Topsent

The species of this genus are characterized by having dermal diactinal spicules, smooth, over monactinal endosomal spicules, usually also smooth, although in rare cases there may be a few small spines scattered here and there. The characteristic microsclere is an arcuate isochela together with which one usually finds sigmas. The genotype is the species recorded from the Dry Tortugas as follows.

Lissodendoryx isodictyalis (Carter) Topsent

Plate 11, fig. 2.

This species is abundant, apparently year after year, in a region about 10 meters square on the wall of the moat of Fort Jefferson. Material for microscopic study was collected on June 28, 1932.

Single colonies are often as much as 8 cm. high and 11 cm. in diameter. The shape varies from encrusting to massive, chiefly, however, it is amorphous. The color at the surface is light green in life, the interior pale grayish yellow, but tinged with green to a distance of at least 1 cm. below the surface. This is probably due to the presence of symbiont algæ. The consistency is very soft, compressible, but easily torn. The surface is undulating, but otherwise essentially smooth. The oscules are very conspicuous, ranging up to 9 mm. in diameter. They are often raised on finger-like processes, 2 cm. or slightly more in height. The dermis is in most places scarcely 10μ thick, but in a few spots it is several times that. It overlies extensive subdermal spaces that are often 200μ in height, the ectosome being held up above them like a roof placed on fascicular columns of the special dermal tylotes, each pillar consisting of six to nine spicules fastened together laterally and being as a column only about one spicule's length in height. The endosome is very much like "crumb-of-bread." The special dermal tylotes are about 4 by 175μ, with very much enlarged heads or knobs at each end, 7μ in diameter. These are strewn tangentially in the dermis throughout its whole extent, and also (as mentioned above) make up erect columns maintaining the subdermal cavities. Just below the subdermal space are occasionally found masses of these tylotes placed perpendicularly to the surface, and the same placement is also found here and there on the extreme outer layer. The interior is chiefly an isodictyal reticulation with the meshes often triangular. The endosomal spicules, which are frequently fastened together side by side, are smooth styles 5 by 145μ. The microscleres comprise abundant arcuate isochelas 21μ in greatest length, and contort sigmas with chord measurement often about 18μ.

This species was first described by Carter (1882, p. 285) as *Halichondria isodictyalis.* It was later described by Topsent (1889, p. 49) as *Tedania leptoderma,* and this made type of *Lissodendoryx* by the latter author (1894, p. 9). Topsent also pointed out the synonymy (1925, p. 701). The above occurrences are each West Indian, but the species also occurs in the Mediterranean and East Indies, according to the identifications of various authors.

Scope of the Family

Other genera of Tedaniidæ include *Anomomyxilla* Burton, which differs from my new genus *Burtonanchora* chiefly in having two types of chelas as well as sigmas for microscleres; one chela type is anchorate and the other unguiferate with many teeth at each end; it should receive in synonymy *Myxilla diversancorata* Lundbeck (1905, p. 150). *Burtonanchora* new genus is hereby proposed for genotype *Myxilla crucifera* Wilson (1925, p. 430), to include those numerous species having dermal diactines over smooth styles as principal spicules with anchorate chelas and sigmas as microscleres. Other species that should be referred to this new genus comprise the following, all placed originally in *Myxilla*: *lacunosa* Lambe (1892, p. 70), *hastata* Ridley and Dendy (1886, p. 472), *magna* Topsent (1916, p. 168), *pedunculata* Lundbeck (1905, p. 148), *pistillaris* Topsent (1916, p. 169), *spongiosa* Ridley and Dendy (1886, p. 471), and dubiously that described as *Amphilectus osculosus* Topsent (1893). For some of these we do not have very complete description of the chelas, which may turn out upon better information to be arcuate instead of anchorate, in which case the proper location would be in the genus *Lissodendoryx.* *Dragmatyle* Topsent is not typical of the family. Its auxiliary diacts are flexuous oxeas instead of the usual straight tornotes. The principal spicules are tylostyles. The microscleres are rhaphides. This may even be a Hadromerine sponge or be Axinellid (Halichondrine), but since the oxeas are definitely recorded as dermal, the classification suggested here seems to be the least objectionable. *Forcepia* Carter has typical megascleres, forceps, arcuate chelas and perhaps sigmas as microscleres. Its genotype needs to be understood as being *F. colonensis* Carter (1874, p. 248). *Forcepina* Vosmaer should be dropped in synonymy to the above; its genotype needs to be understood as being *Halichondria forcipis* Bowerbank (1866, p. 244).

It has been the custom to refer to the genus *Iotrochota* those sponges possessed of the peculiar microscleres called birotulates. These spicules are common in the fresh-water sponges, but are relatively uncommon in marine sponges except those belonging to the class Hyalospongiæ. Although infrequent among the Demospongiæ, their possession by different sorts of sponge does not necessarily indicate exceedingly close relationship between such sorts. In fact, upon closer investigation, we find two types of megasclere architecture associated with these microscleres. In *Halichondria birotulata* Higgin (1877, p. 297), the genotype of *Iotrochota*, the megascleres are strongyles and the microscleres are only birotulate, such a species is clearly a member of the family Desmacidonidæ; typical of that family in dermal structure and general shape. The contrasting group hitherto also regarded as *Iotrochota* not only has the characteristic Tedanid structure of tylotes for special dermal spicules over smooth principal spicules below, but also has (unguiferate) chelas in addition to the birotulates, in almost all specimens. For this latter group I propose a new genus to be called *Iotaota*. The genotype should be *Halichondria abyssi* Carter (1874, p. 245). Other species originally described as in the genus *Iotrochota*, which should be referred to this new genus include *acanthostylifer* Stephens (1916, p. 236), *affinis* Lundbeck (1905, p. 194), *dubia* Lundbeck (1905, p. 189), *intermedia* Lundbeck (1905, p. 190), *oxeata* Lundbeck (1905, p. 186), *polydentata* Lundbeck (1905, p. 192), *rotulancora* Lundbeck (1905, p. 191), *spinosa* Lundbeck (1905, p. 195), and *varidens* Lundbeck (1905, p. 185). It will be noted that this new genus is practically exclusively Arctic. Only one species (*acanthostylifer*) is found as far south as Ireland. *Iotrochota* proper is found in the West Indies, the Mediterranean, and the Australian regions.

Megaciella Hallmann is very like *Lissodendoryx*, but has palmate instead of arcuate chelas. It should receive two species from the genus *Amphilectus*, namely *annectens* Ridley and Dendy (1886, p. 351), and *tibiellifer* Ridley (1884, p. 428). *Melonanchora* Carter has unique microscleres. *Rhabdoploca* Topsent has curved diactines, so the possibility of relationship to *Bubaris* exists. *Stelodoryx* Topsent has peculiar microscleres which suggest some relationship to the Cladorhizidæ. *Strongylamma* Hallmann is difficult to place in any family satisfactorily. The large quantity of sand present suggests relationship to the Psammascidæ, the lack of monactinal spicules suggests possible placement in the family Phorbasidæ, but in general the genus is simply a *Tedania* without the principal spicules, they being replaced by sand; even the microscleres are characteristic of *Tedania* and it seems to me very close to that genus, nevertheless it is with considerable doubt and hesitation that I leave it here. Much the same problem arises in connection with the new genus here proposed, *Tedaniphorbas*, for genotype *Amphilectus ceratosis* Ridley and Dendy (1886, p. 350). In this also the principal skeleton is wanting, the fibers are of spongin only, but the dermal skeleton of tylotes is characteristic of the family Tedaniidæ; the microscleres are palmate isochelas, as in *Megaciella*. Comparison to the genus *Cornulum* is also interesting. *Waldoschmittia* new genus is here proposed for genotype *Crella schmidti* Ridley (1884, p. 432). This is superficially rather close to the genus *Lissodendoryx*, but the chelas are unusual, perhaps techincally to be regarded as arcuate, but not typically so, and in addition to the monactinal principal spicules there are also oxeas in the endosomal skeleton. *Lissodendoryx* has typical arcuate chelas and no endosomal diacts. The dermal spicules are tylotes, as characteristic of Tedaniidæ in general. Another species that should be referred to this new genus is *Damira australiensis* Dendy (1896, p. 28). The name is given in respect to the eminent zoologist, Dr. Waldo Schmitt of the U. S.

National Museum. *Valentis* new genus is hereby proposed for genotype *Desmacidon lentis* Vosmaer (1880, p. 131). In this the dermal spicules are strongyles and the principal spicules tylostyles, a rather remarkable occurrence for the Tedaniidæ, but the general spiculation is such as to indicate that this is the correct family. The microscleres are also odd in that there are both palmate and tridentate forms, a combination seldom found. Another species that should be referred to this new genus is that first described as *Desmacidon elastica* Vosmaer (1880, p. 132), concerning which the possibility exists that it is also conspecific as well as congeneric with that selected here as the genotype.

PSAMMASCIDÆ new family

This family is here established for a group of sponges characterized by having skeletons that are chiefly composed of sand, the grains united by small bits of spongin or other organic connective material. Spicules also usually occur, perhaps in some cases foreign, but it is agreed that in many cases they are proper. These comprise monactinal and diactinal megascleres, also chelas, sigmas and toxas as microscleres. In the genus *Psammopemma*, there seem to be no proper spicules at all. This particular genus is very much like *Dysidea*, which is here classified (as is customary) with the Dictyoceratina, or Keratosa. From *Dysidea* it may indeed be distinguished only with difficulty on paper, the most significant matter being that of general appearance, which is hard to describe. This, however, may be said, that *Dysidea* is markedly conulose, and *Psammopemma* only irregularly or dubiously so. A very decided possibility remains for consideration that *Dysidea*, and perhaps others of the Keratosa, are really monaxon sponges that have lost their spicules. By actual comparison of specimens, however, *Psammopemma* would appear to be much more closely related to other genera here assigned to the Psammascidæ than to the Dysideidæ. The sporadic occurrence of echinating spicules is almost the only reason for placing this family elsewhere than in the Haplosclerina, as there are seldom recognizable categories of megascleres with special locations; it may be assumed, however, that the primitive spiculation comprised ectosomal diacts over endosomal monacts and that whereas some species have lost the one sort, others have lost the other. This type of reasoning is admittedly not reliable, but it is appropriate in conjunction with the definite existence of echinating spicules as confirmation.

This family is represented in the vicinity of the Dry Tortugas by two species.

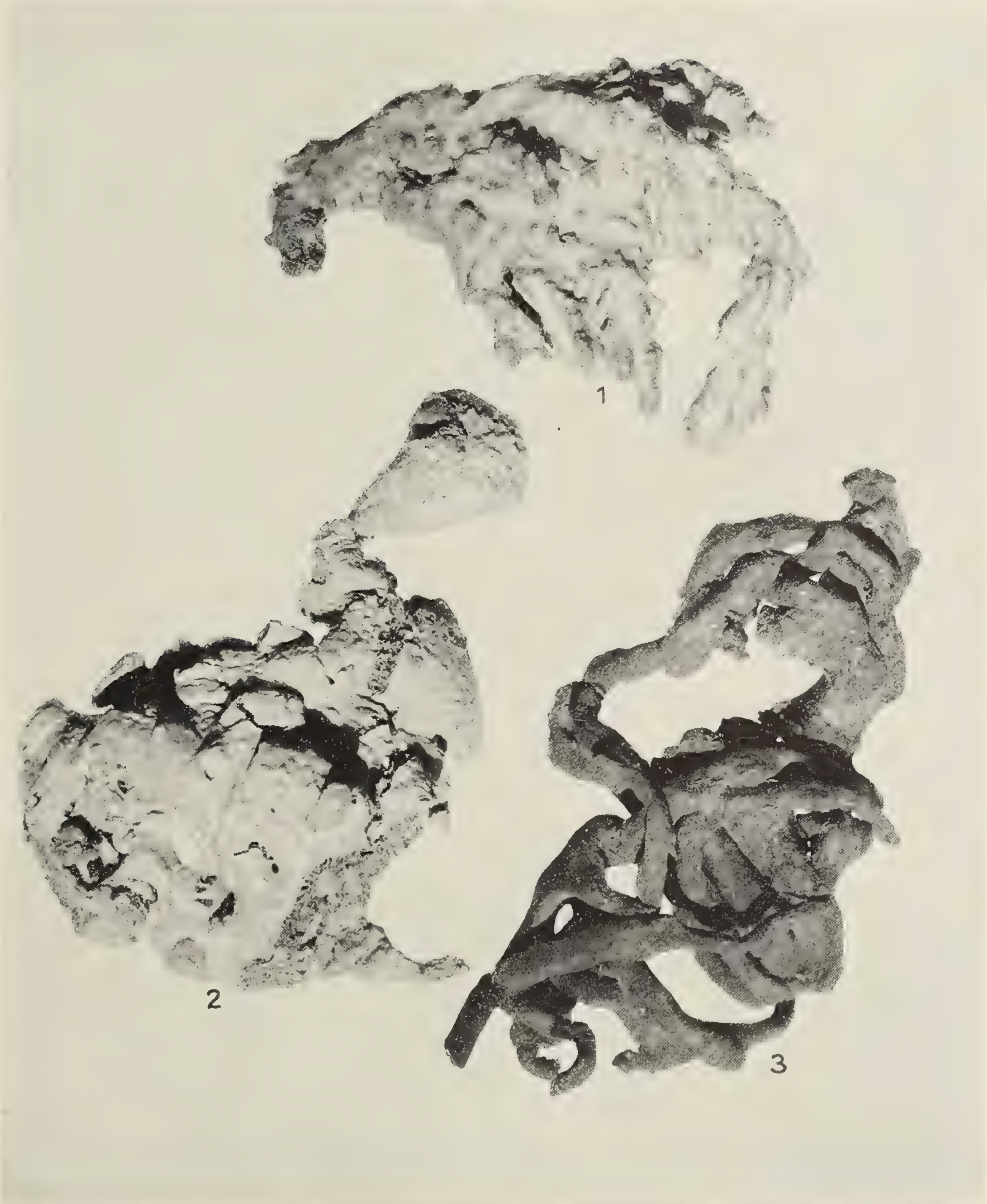
PSAMMASCUS Marshall

This genus, which in some ways is the most representative, may be differentiated from others in the family by its possession of both monactinal and diactinal megascleres and only sigmas as microscleres. There seems to be no basis for separating *Phoriospongia* from *Psammascus* except that in the latter the diactinal spicules are more common; it is therefore proposed that *Phoriospongia* be dropped in synonymy.

Psammascus psellus new species

Plate 6, fig. 1.

The Holotype, U. S. Nat. Mus. Cat. No. 22438, was dredged June 16, 1932, from a depth of 70 meters, southeast of Loggerhead Key. Another specimen was dredged from the same locality at a depth of 90 meters, July 2, 1932. This specimen is probably, but not certainly, conspecific, has many more branches, and is the one illustrated.



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Thalysias juniperina*. Figure 2, *Holopsamma helwigi*. Figure 3, *Aulospongus schoenus*.

The shape is cylindrical with one dichotomous branching. The cylindrical stems are about 1 cm. in diameter and the total height is 11 cm. In life the color was pink, somewhat obscured by gray foreign material on the surface. The consistency was elastic, soft, easily torn. The surface is conulose or tuberculate with conules about 0.3 mm. high, irregular and not sharp and distinct as in the Keratosa; they are about 1 mm. apart. No conspicuous horny cuticle is in evidence. There are some surface openings 130 to 170μ in diameter, but none that are to be readily differentiated as between oscules and pores. The endosome contains great quantities of foreign material, often in the form of sand grains 50 to 150μ in diameter. In places short strands of fiber packed with foreign inclusions can be made out, they are in the neighborhood of 150μ in diameter. Mostly, however, the interior contains just lumps and masses of calcareous stuff cemented together by a minimum of organic material.

Bits of this sponge upon being defleshed with boiling nitric acid show among fragments of obviously foreign spicules, quite a few megascleres all of one kind and therefore probably proper. These are strongyles that verge upon being tylotes, dimensions 2 by 150μ to 3 by 160μ. There are also very numerous sigmas 10μ in chord diameter, that are almost certainly proper.

The nearest species to *psellus* already described would seem to be that named *Phoriospongia levis* by von Lendenfeld (1888, p. 193). This differs in having smaller megascleres and much larger microscleres, also somewhat in the structure of the fiber, and its habitus is lamellar with processes instead of the almost ramose form of the West Indian species here described. None of these differences in themselves are large, but taken together call for the erection of a new species.

HOLOPSAMMA Carter

This genus has both monactinal and diactinal megascleres, but may be distinguished from other members of the family having megascleres by its lack of microscleres. On the basis of published descriptions there seems to be no good reason for keeping *Sigmatella* Lendenfeld separate from this earlier genus and I hereby propose, therefore, that *Sigmatella* be dropped in synonymy.

Holopsamma helwigi new species

Plate 13, fig. 2; Plate 20, fig. 2.

The holotype, U. S. Nat. Mus. Cat. No. 22412, was dredged east of Loggerhead on June 23, 1932, from a depth of 17 meters. The dredge brought up three pieces in this haul, presumably originally from the same colony, and this set will be referred to as specimen number one. On June 25, 1932, specimen number two was dredged east of the White Shoal at a depth of 15 meters. Specimen number three was dredged July 7, from 19 meters depth, west of the White Shoal. Specimen number four was dredged east of Garden Key, July 27, 1932, at a depth of 25 meters. It would seem that in a limited range of depth this is a fairly common species.

The shape is digitate; there is a basal lamellate mass about the size of the palm of a hand, with cylindrical branches rising from it. In specimen number one these are 15 mm. in diameter, 8 to 12 cm. high. In specimen number two they are 5 mm. in diameter, 12 cm. high. In the other specimens the thickness is intermediate. The color in life was a lovely red, the ectosome appearing pink because of the great amount of mineral matter in it. The color fades extensively in alcohol and also on drying. The consistency is softly spongy, easily torn. The surface exhibits low, blunt irregular conules, or rather tubercules, scarcely 0.5 mm. high and 1 to 3 mm. apart, otherwise the surface is comparatively smooth. The oscules can not be seen, but all specimens had cracks in the dermis upon collection which may just barely be proper and exhalent, but on the other hand may merely mean that this type of injury occurs very readily, during collection, to the species under discussion. The ectosome is densely packed with bits of sand, 10 to 100μ in diameter, often about 50μ. It is pierced with apertures 40 to rarely 150μ in diameter, often about 60μ in diameter. Perhaps the larger are exhalent, but the majority would certainly seem to be pores. In places these openings are so close together that they make the ectosome assume a structure that might be described as honeycombed, with cells of which the lumen is 35 to 40μ in diameter, the walls 40μ thick. The thickness of the cortex varies from 40 to 240μ but is very often under 100μ, its general appearance is very like that of fleshy skin. From it spicules about 200μ apart protrude to a distance of some 40μ. The endosome is densely filled with flesh and bits of sand, leaving comparatively small spaces for canals. The flagellate chambers show plainly in specimen number two as eurypyllous, oval, about 45 to 70μ. Specimen number four is full of chambers 70 to 85μ in diameter; these are probably, but not certainly, the flagellate ones. In general, the minute structure is very difficult to make out, as might be expected in view of the enormous amount of foreign material present. In addition to the great quantities of sand and some obviously foreign spicules there are numerous oxeas, 1 by 108μ to 3 by 150μ, more often near the larger than the smaller size, which spicules are perhaps proper. These are often strewn in confusion, but in places they form an isodictyal reticulation with meshes 95μ per side. There are some ascending tracts of spicules in 5 or 10 rows, total tract diameter about 30μ.

This beautiful species is named in respect to Edwin R. Helwig of the University of Pennsylvania. In comparison to *Holopsamma crassa* Carter (1885, p. 211) here designated as the type of the genus, *helwigi* has only diactines for megascleres and these oxeote rather than strongylote; its honeycomb surface furthermore is very much finer than that of Carter's specimen. Comparison may be made to *Sigmatella macropsamma* Ledenfeld (1888, p. 198) which also has only diactines, but these are strongylote. The surface appearance is very different, its oscules are very evident and there are conspicuous longitudinal ridges. Both *crassa* and *macropsamma* are Australian species. Burton in his 1934 article on the sponges of the Australian Great Barrier Reef makes many comments to the frequency of relationships indicated between West Indian and Australian species of sponge. It is certainly evident again and again that the nearest relatives of the West Indian forms are to be found in the Australian region.

It would seem that there are no other records from the West Indies of members of the family Psammascidæ; this is odd in view of the comparative abundance of the family in the vicinity of the Dry Tortugas. I have seen rather extensive collections from other portions of the West Indies from which Psammascidæ were notably absent, so that it may indeed be the case that the family is not well represented in this part of the world.

Scope of the Family

Eight other genera in addition to *Psammascus* and *Holopsamma* would seem to be typical of this family. *Clathriopsamma* Lendenfeld has monaxons, chelas, toxas and rhaphides, some of the spiny monaxons seem clearly to be echinating, perhaps all are. *Desmapsamma* Burton has diactinal megascleres only, chelas and sigmas, and should probably receive *Phoriospongia osburnensis* George and Wilson (1919, p. 154), although there is some doubt as to whether or not there is sufficient resemblance in the type of chelas to warrant the two being regarded as congeneric. *Fusifer* Dendy, like *Clathriopsamma*, has monaxons that are partly spiny, its microscleres are only toxas and there are peculiar fusiform microxeas. *Psammochela* Dendy has both monactinal and diactinal megascleres and numerous microscleres, including two sizes of (arcuate?) chelas, and also sigmas. On the basis of information furnished in the recent publication by Topsent, *Alcyonium papillosum* Lamarck (1815, p. 164) should be referred to this genus. *Psammodoryx* Burton apparently has no proper megascleres at all but only microscleres, namely (arcuate?) chelas. *Psammopemma* Marshall, as mentioned above, has lost its spiculations still further, having only detritus as inorganic skeletal material. A new genus *Psammotoxa* is hereby proposed to have as genotype *Phoriospongia guettardi* Topsent (1933, p. 19), a genus characterized by having monaxon megascleres which are smooth, not spiny, and having toxas as microscleres along with the other traits of the family. It has a particularly enormous amount of detritus present. *Tedaniopsamma* Burton has a similar spiculation except that rhaphides take the place of the toxas.

Other names that need to be considered in this connection comprise *Chondropsis* Carter, of which the genotype *Chondropsis arenifera* Carter (1886, p. 122) should be referred (and therefore the genus with it) in synonymy to *Holopsamma.* The eight other species need to be transferred into synonymy with *Psammascus.* They are as follows: *Chondropsis ceratosus* Kirkpatrick (1900, p. 355), *Phoriospongia chaliniformis* Lendenfeld (1887), which is not the same as *Dysidea c.* of Carter, *Chondropsis columnifer* Dendy (1895, p. 254), *Spongia confederata* Lamarck (1814, p. 438), *Dysidea kirkii* Carter (1881, p. 374), *Phoriospongia lamella* Lendenfeld (1888, p. 194), *Chondropsis syringianus* Whitelegge (1906, p. 464), *Chondropsis topsenti* Dendy (1895, p. 254), *Chondropsis wilsoni* Dendy (1895, p. 252). *Phoriospongia* Marshall, of which the genotype is here established as *Phoriospongia solida* Marshall (1880, p. 122), as mentioned above, should be dropped into synonymy to *Psammascus.* *Sigmatella* Lendenfeld, of which the genotype is here established as *Sigmatella macropsamma* Lendenfeld (1888, p. 198), should be dropped into synonymy with *Holopsamma.*

RASPAILIIDÆ Hentschel

This is a moderately homogeneous group of genera. The external form is exceedingly ramose. In some fundamentally rather massive sponges, as for example of the genus *Haliclona,* the growth may lead to long cylindrical processes, perhaps as a result of some environmental stimulus. In contrast to this, the Raspailiidæ seem to be thin stringlike sponges even when very young. Mature colonies are often groups of one to three basal stems, each having from none to two branches; trunks and branches alike are only 2 to 5 mm. in thickness and are often 20 to 30 cm. long. As a rule the surface is pronouncedly hispid; spicules may protrude as much as a millimeter. The color is regularly dull, and the consistency flexible rather than elastic. A rather consistent spiculation accompanies this structure. The spicules are arranged in a manner so nearly plumose that there is much reason for ascribing the family to the Halichondrina in the neighborhood of the Axinellidæ. Against this may be placed the fact that in the Raspailiidæ a considerable fraction of the spicules are clearly echinating as contrasted to another principal portion that may be said to "core" the fibers or tracts. The Axinellidæ may be described instead as having only spicules of the coring type, but those placed exclusively in the echinating position. This is most significantly approached by the Ophlitaspongiidæ, whose tracts are echinated by megascleres of the coring type, rather than by acanthostyles. Also, while there are many exceptions, the typical Raspailiidæ have special dermal diacts and monactinal main megascleres. In some the ectosomal spicules are monacts, and it might be argued that these should be removed to the Microcioniformes, but the agreement in other respects is so close that this is decidedly contra-indicated; this occurrence does, however, render the problem of placing the family very puzzling. Finally, there is a decided shortage of microscleres, by which resemblance is again shown to the Axinellidæ, rhaphides being practically the only kind to occur here. The Raspailiidæ not only occur in the West Indies in general, but also in the vicinity of the Dry Tortugas.

AULOSPONGUS Norman

The type of this genus seems to have been more or less hollow internally, but not with a terminal opening as in *Siphonochalina*. In general it is much like *Raspailia*, except that the special dermal spicules are monactinal. The taxonomic problem that arises from this fact has already been mentioned. Other species referred here have been much less strikingly like rat tails than is *Raspailia*, but the Tortugas species (*schoenus*) is entirely raspailioid in habitus.

Aulospongus schoenus new species

Plate 13, fig. 3.

The holotype, U. S. Nat. Mus. Cat. No. 22404, was dredged east of Loggerhead Key, Dry Tortugas, June 22, 1932, from 17 meters. This species is exceedingly abundant in the region just east of Loggerhead Key at depths of about 15 to 20 meters. Dredging operations frequently brought up literally bucketsfull. The form is ramose, with frequent branching, the branches are about 4 to 7 mm. in diameter and make strands commonly 15 to 20 cm. long. They are not straight, but bend a little from place to place and have low protrusions on them here and there. There are frequently fifteen or more branches per colony. The color in life is a rich vermillion, overlaid on most of the surface by a thin sheen, presumably only one cell layer thick, of greenish yellow. This layer shows aggregations into canals arranged like river systems and presumably terminating in oscules. The consistency is very spongy, but soft and very flexible, so that the branches will not support their own weight out of water and barely support it under water. They do not tear easily, but are like wet string. The surface is smooth to the naked eye, and a thin skin, about 40µ thick, may be readily detached; such procedure uncovers the fibro-reticulate endosome. Microscopically the surface is densely echinated with erect spicules, pointing out, and it also contains a confusion of spicules tangentially placed. Neither pores nor oscules show to the naked eye, the latter probably being very quickly and readily closed. Burton, in his 1934 report on the sponges of the Great Barrier Reef, points out the interesting fact that sponges occasionally temporarily or permanently lack the canals and oscules, due to some physiological condition, not well understood. That this is not the case with these Dry Tortugas specimens, however, would seem to be indicated by those dermal structures (referred to above) that very likely represent collapsed subdermal canals leading to oscules, as in *Iotrochota birotulata*. An occasional opening in the dermis between 100 and 200µ in diameter may be found, which perhaps represents the pore system. The endosome is fibro-recticulate, but the fibers seem so irregularly patterned that it is difficult to assign a size to the meshes. They are perhaps 300 to 400µ across. The fibers are of yellow spongin and vary from a diameter of 30 to 70µ. Usually they contain about four to six spicule rows. There are loose spicules in the flesh, and the dermis, as mentioned above, is packed with spicules, some of them tangentially arranged and some in projecting surface brushes, resembling those in the family Axinelliidæ. The flagellate chambers are circular in sections and about 30μ in diameter. The principal spicules are tylostyles with heads so small that there is close resemblance to styles. They are not fusiform in the shaft, but instead are nearly straight, thin and very sharp-pointed. There is practically infinite size variation between 0.5 by 45μ and 5 by 375μ. The echinating spicules are acanthostyles about 3 by 43μ, with very few spines at the larger end, whereas the pointed end is profusely provided with them.

All the specimens of this species that I examined microscopically (and judging from appearances the same is true of all the others as well) were provided profusely with slipper-shaped enucleate opaque cells about 4μ by 12μ. These were identified for me by Professor Yamanouchi of the University of Chicago, as Cyanophyceæ of the genus *Gloeothece*.

This species is distinguished from others in the genus very decidedly by its peculiar dermal structure, which is only microscopically hispid, instead of coarsely so. It has much more of a detachable skin than is the rule. In other respects it is somewhat like the genotype *Halyphysema tubulatum* Bowerbank (1873, p. 29), from India.

Scope of the Family

Nardo in 1833 established a genus *Raspelia* for *Raspelia typus*, an undescribed species, therefore a nomen nudum, and for *Spongia dichtoma* Linné (1767, p. 1299), which has since been referred by Burton (1930, p. 501) first to the genus *Dictyoclathria* and then (probably correctly) in the same work (p. 533), to the genus *Antho*. Acording to the rules of International Zoological Nomenclature a species named *typus* should be taken as the type of the genus, in which case the genus *Raspelia* might be assumed to be unrecognizable, as *typus* is a nomen nudem. If we were to assume that the only described species should be taken as the type, that would be *dichotoma*, and therefore *Antho* would fall in synonymy to *Raspelia*. Schmidt in 1862 referred to this genus as *Raspailia* and, according to interpretations of the rules of International Zoological Nomenclature, he was justified in doing this because the man for whom the genus was named spelled his name "Raspail" rather than "Raspel." One interpretation of opinion 46 of the International Rules of Zoological Nomenclature would be to the effect that Schmidt's recognizably described species causes *Raspailia* not only to become a usable genus, but that it should date from 1833. This may be a correct interpretation, but not certainly so, because in that same opinion it is positively stated "no species is available as genotype unless it can be recognized from the original generic publication," hence no sponge is available as type of the group diagnosed by Nardo. Schmidt's genus, of which we may take *Raspailia viminalis* Schmidt (1862, p. 52) as the genotype, is, however, a recognizable one, and the majority of the very numerous sponges referred to it would seem to be congeneric with *viminalis* and represent a very well-known group, for which it would be a pity to need to seek a new appellation. There is this further complication, that Schmidt's genus is very clearly congeneric with *Dictyocylindrus* of Bowerbank (1862, p. 1108), which might possibly have priority over Schmidt's name; it seems impossible to ascertain whether Schmidt's or Bowerbank's was published first. I do not believe that we can prove beyond a shadow of a doubt that Schmidt's name is required by any rule, but neither can we prove that Bowerbank's is required; presumably the best nomenclatural procedure in such a perplexing case is to follow established usage which is here to employ the name *Raspailia*. The principal spiculation of this genus consists of relatively large tylostyles and, as what we may term dermal spicules, smaller oxeas in fan-shaped bunches. The auxiliary (or echinating) spicules are acanthostyles.

In addition to *Raspailia* there are the following typical genera of the family Raspailiidæ. *Axechina* Hentschel has some of the coming spicules diactinal and most of the echinating spicules not spined; also there are microstyles. *Clathriodendron* Lendenfeld supposedly lacks the dermal spicules entirely. *Echinaxia* Hallmann has no diacts and tends to assume a fan shape not typical of this family. *Ectyoplasia* Topsent is very much like *Aulospongus* but has both diacts and monacts as ectosomal spicules, showing a state intermediate between *Aulospongus* and *Raspailia*. *Endectyon* Topsent, of which the genotype *Phakillia tenax* Schmidt (1870, p. 62), is a West Indian species, has no diacts, and its echinating spicules have a very distinctive shape; the external form of the sponge is also peculiar. *Hemectyon* Topsent, of which the species described first as *Raspailia hamata* Schmidt (1870, p. 62) is a West Indian species, may be discussed in practically the same wording as that used for *Endectyon*. *Protoraspailia* Burton and Rao has rhaphides. *Raspaxilla* Topsent has very simple spiculation, seemingly only one kind of smooth style and one sort of echinating acanthostyle. There are three species that need to be transferred to *Raspaxilla*; they are *Eurypon mineaceum* Thiele (1905, p. 446), *Raspailia irregularis* Hentschel (1914, p. 121), and *Raspailia topsenti* Dendy (1924, p. 355). *Rhaphidectyon* Topsent, which should receive *Thrinacophora dubia* Brøndsted (1924, p. 157), seems to lack the ectosomal spicules, but has diacts as microscleres.

Dendy (1896, p. 47) described a sponge as *Raspailia vestigifera*. This has a principal skeleton of smooth oxeas, longitudinally arranged in the axis of the sponge and in surface brushes, with a rather plumose architecture. There are echinating acanthostyles. The spiculation is very like that of *Echinodictyum* Ridley, but in that genus the principal spicules are arranged in a reticulation and there is little or no evidence of a plumose form. The general structure is that of the family Raspailiidæ, where I believe the species should go, but a new generic name would seem to be required for it and I therefore propose that it be called *Valedictyum*. Another genus that is referred to this family with some hesitation is *Parasyringella* Topsent, in which there were axial large smooth styles and auxiliary smaller tylostyles. In the generic diagnosis the statement is made that the genus is characterized by possessing spined spicules, but in the species description I do not find that such are mentioned, which is rather puzzling. Doubtless some typographical error is involved. *Pitalia* Gray probably represented species belonging in the Raspailiidæ, but so insufficiently described that the genus must be regarded as probably unrecognizable, as is also *Raspaigella* Schmidt, although there is some reason to think that the latter is a synonym of *Raspailia*.

There are other generic names that need to be considered in this connection. *Abila* Gray, which is the genus of that name described in Gray (1867, p. 522, not the one of the same name described in the same article on page 539), has been replaced by Strang (in 1928, circa p. 33), by the new name *Abilana*. Both *Abilana* and *Abila* of Gray (p. 539) mentioned above are synonyms of *Raspailia*. Of *Dictyocylindrus* Bowerbank, the genotype has been taken as *Spongia hispida* Montagu (1818, p. 81), but this species name was preoccupied by Lamarck (1814, p. 452), consequently a new name is needed for that of Montagu, so it is hereby proposed that it be called *montagui; Dictyocylindrus* is a synonym of *Raspailia*. *Rasalia* Gray is also a synonym of *Raspailia*, and probably the same is true of *Stelligera* Gray.

AMPHIBLEPTULIDÆ new family

This family is hereby proposed for a group of lithistid sponges concerning which there exist a few clues indicating relationship with the family Myxilliidæ. As is true of all lithistid sponges, the principal skeleton consists of spicules greatly given over to warty and distorted modifications, and at best one must hazard a guess as to the sorts that existed before the malformations were superimposed.

Scope of the Family

Amphibleptula Schmidt, the typical genus of the family, is a West Indian species, of very elaborate external form. The spiculation consists of monactinal styles and desmas. There are other genera that show closer relationship to the Myxilliidæ than this, but they are later, and it seems as plausible to assume that *Amphibleptula* is a distorted *Myxilla* as to compare it to any other known genus.

Other genera that may be assigned here include *Lithobactrum* Kirkpatrick, which has oxeas and styles as well as desmas; *Lithochela* Burton, which has styles, unguiferate chelas and desmas; *Plakidium* Lendenfeld, which has tylotes and a trellis of desmas; *Monocrepidium* Topsent, which has twisted oxeas as in the genus Bubaris, associated with smooth styles (needless to say its family location is very puzzling); *Sulcastrella* Schmidt, which has strongyles and tricrepid desmas; and finally *Sympyla* Sollas, which has tylotes and desmas, but differs from the above mentioned *Plakidium* Lendenfeld in that it has vase-like shape and raised pore areas.

MICROCIONIFORMES

This artificial group is here employed for the families Microcionidæ, Ophlitaspongiidæ, Cladorhizidæ, Amphilectidæ and Desmanthidæ. The last mentioned is provided for genera of lithistid sponges that, by inference, are considered as being more closely related to the other families mentioned above (in this paragraph) than they are to the other lithistid varieties. The next to the last is not entirely typical of the Pœcilosclerina in that its genera lack echinating spicules and do not often have spicules that are clearly dermal. The presence of spiny megascleres, however, while true of some of the Haplosclerina (in the family Spongillidæ) is in general a Pœcilosclerine trait, and certainly there are very different spicule sorts within each species assigned to the Amphilectidæ. The Cladorhizidæ are remarkable for strange bodily form rather than for their spiculation. The really typical families of this artificial group are the Ophlitaspongiidæ and the Microcionidæ. These show the closest relationship to the succeeding order (the Halichondrina) of any of the Pœcilosclerina. Some sponges are perhaps transitional forms between the two orders, for example, the genera *Artemisina*, *Phelloderma* and *Camptisocale* of the family Ophlitaspongiidæ approach the sub-radiate architecture of the ensuing orders rather than the fibroreticulate plan characteristic of the Pœcilosclerina. The Microcionidæ answer nicely to the description of the Microcioniformes in general. The genera of this family have special dermal monacts, monactinal principal spicules and acanthostyles as echinating spicules. Spongin fibers in reticulation are of fairly common occurrence. From them the genera assigned to the Ophlitaspongiidæ differ only in the apparently slight respect that their echinating spicules are not spined. To return particularly to the Ophlitaspongiidæ; in the genera assigned to this family the echinating spicules may resemble the coring spicules closely. When they do so, the resulting skeletal tract has very decidedly the appearance of being plumose. Whereas the plumose architecture may be derived from the radiate type by vertical elongation, it may also be derived from the fibrous plan by proper emphasis on the echinating spicules. Since the sponges here assigned vary markedly in the direction of an entirely different order, even though to so limited an extent, it is convenient to keep them separate from the Microcionidæ. Another justification is that there are exceedingly numerous genera involved and from their mere abundance arises a need for appropriate subdivision.

MICROCIONIDÆ Hentschel

The architecture of this family is fibrous, with spiny spicules echinating the fibers. The coring spicules are monactinal, often smooth. In general there is much resemblance to the Myxilliidæ, except that the dermal spicules are monactinal instead of diactinal; and to the family Plocamiidæ, except that the principal spicules are monactinal instead of diactinal. This is the family which has been called by many authors Clathriidæ, but the genus *Clathria,* as indicated by the type specimen of the type species, does not even belong in this family, instead it is a very poorly characterized sponge of which the family location is entirely uncertain; by surmise it might be given as Ophlitaspongiidæ. Microcionidæ are moderately common in the West Indian region and represented in the vicinity of the Dry Tortugas by two species.

It is suggested that the Microcionidæ be divided into two subfamilies, the Microcioninæ (comprising the bulk of the genera) in which the ectosomal spicules are predominantly or entirely smooth, and the Yvesiinæ (otherwise rather similar) in which the ectosomal spicules are predominantly or entirely spiny. The Microcionidæ that occur near the Dry Tortugas will be considered first; they are of the subfamily Microcioninæ.

THALYSIAS Duchassaing and Michelotti

This genus, which was established by Duchassaing and Michelotti (1864, p. 82), is there very inadequately characterized. The species referred by those authors to the group are very diverse and would be put by a modern systematist in many different genera. It is here proposed that the genotype be established as that specimen which Duchassaing and Michelotti identified as being *Spongia virgultosa* of Lamarck and placed in their new genus. Since this synonymy is very questionable indeed, Lamarck's description being unrecognizable, the species should be treated as being *Thalysias virgultosa* Duchassaing and Michelotti (1864, p. 86). This, however, as explained below, becomes *Thalysias juniperina* (Lamarck). The genus may therefore appropriately be redescribed as for sponges having a well-developed reticulate horny skeleton, the fibers cored by smooth monaxons and echinated by spiny monaxons, with very numerous monactinal dermal spicules, usually erect, and subtylostylote. This genus is very closely related to *Microciona,* and in fact may technically be congeneric; practically the only difference is the more elaborate development of both horny fibrous skeleton and dermal skeleton. It is very probably the case that there are some sponges, properly of the genus *Thalysias,* which when young would be identified as *Microciona.* I would suggest that only those which remain very thin without any extensive reticulation throughout their entire life history be regarded as *Microciona* proper, and if it should prove that there are none such, but that all which begin by being Microcionid later become Thalysid, that then the name *Thalusias* should drop in synonymy to *Microciona.* We do not have adequate data to justify such a step at present. The genus which has been known variously as *Tenacia* and *Rhaphidophlus* (the two names having been given practically simultaneously by Schmidt and Ehlers, respectively), is entirely congeneric with *Thalysias* as here described; very numerous species which have been described as of the genus *Clathria* are also congeneric. It is here proposed that the following species described as of the genus *Clathria* be now transferred to *Thalysias: angulifera* Dendy (1896, p. 32),

arcuophora Whitelegge (1907, p. 500), *calopora* Whitelegge (1907, p. 499), *claviformis* Hentschel (1912, p. 366), *compressa* Schmidt (1862, p. 58), *copiosa* Topsent (1889, p. 40), *coppingeri* Ridley (1884, p. 445), *cullingsworthi* Burton (1931, p. 345), *delicata* Lambe (1896, p. 192), *encrusta* Kumar (1925, p. 221), *fasciculata* Wilson (1925, p. 442), *hartmeyeri* Hentschel (1911, p. 379), *intermedia* Kirk (1911, p. 579), *lævigata* Lambe (1893, p. 31), *lendenfeldi* Ridley and Dendy (1886, p. 474), *longichela* Topsent (1928, p. 300), *madrepora* Dendy (1921, p. 68), *mixta* Hentschel (1912, p. 367), *nuda* Hentschel (1912, p. 364), *oculata* Burton (1933, p. 250), *ramosa* Lindgren (1897, p. 482), *raphidotoxa* Stephens (1915, p. 445), *spicata* Hallmann (1912, p. 210), *striata* Whitelegge (1907, p. 495), *tenuifibra* Whitelegge (1901, p. 82), *toxiprædita* Topsent (1913, p. 620), *transiens* Hallmann (1912, p. 226), *ulmus* Vosmaer (1880, p. 151), *whiteleggei* Dendy (1922, p. 67).

Thalysias juniperina (Lamarck) new combination

Plate 13, fig. 1.

This is a moderately common species near the Dry Tortugas in water somewhat deeper than 10 meters. The shape is ramose to clathrose, due to the fact that the branches frequently coalesce upon contact. These branches are characteristically very lumpy, with lumps about 1 mm. high and 4 mm. apart, quite distinct. A fairly large fraction of the specimens found in the field have only the beginnings of these branches, and one or two are merely thin encrustations. The latter are scarcely to be discerned from *Microciona*, but in England I have studied *Microciona atrasanguinea*, the type of that genus, and find no evidence that it ever grows up to become ramose or clathrose. Is this perhaps an inhibition due to some ecological factor? We have no satisfactory proof that it is. The maximum height of *juniperina* is at least 12 cm. with a thickness of branches of from 1 to 3 cm. These are always very crooked, so that the total shape of the colony is unsymmetrical in general. The color of the flesh seems to be uniformly a bright spectral red, with this common apparent exception, that typically there are very numerous erectly placed tylostyles in the ectosome, and when exceptionally numerous they produce a pink rather than a red total appearance. It is worthy of serious consideration that one principal basis for distinction between the genus *Microciona* and the genus *Thalysias* is the presence or absence of this special dermal armour, which is present only to a very feeble extent in *Microciona*, but pronouncedly so in *Thalysias*. Here I rather stress the ramose as compared to the encrusting form, but this is largely because for many sponges involved there is not adequate data in the literature as to the extent of the dermal armature. Practically all of the species described as *Tenacia* or *Rhaphidophilus* do have this thick dermal spiculation and certainly should be transferred into *Thalysias*. The consistency is toughly spongy. The ectosome consists of a fibro-reticulate dermis over cavities, but it can be removed only with very great difficulty. It is provided, as mentioned above, with numerous thin erect spicules. There are a few openings scattered here and there, 2 or 3 mm. in diameter, which are probably oscules, but not certainly so, as they may be merely accidental. The pores are usually under 50μ in diameter as found in preserved specimens. The flagellate chambers prove to be exceptionally large, subspherical, 40 to 45μ in diameter. The fibers are of clear spongin and range from 50 to 100μ in diameter. They form rounded meshes that vary from 150 to 500μ, or even in rare cases to a somewhat larger size. The dermal spicule is a long thin tylostyle, with such a small head that some individuals are scarcely more than styles; the size range is from 2 by 170μ to 4 by 210μ; such spicules are found not only at the surface but also interstitially and (rarely) in the fibers.

The spicules to be regarded primarily as coring spicules are styles, rarely subtylostylote, and from 7 by 170μ to 9 by 165μ in size. While the vast bulk of these occurs in the center of the fibers, a few also are interstitial. The fibers are abundantly echinated by acanthostyles 4 by 42μ to 5 by 50μ; they are profusely spined over the pointed half, but are smooth over the other end, except that the rounded termination is again profusely spiny. In some cases there are scattered spines over the entire spicule, but the shape as given above is typical. There are very thin toxas scarcely 0.4μ in diameter and 27 to 36μ long. Because of their extreme thinness they are easily overlooked. Sometimes they appear to be almost straight and in such cases are considerably longer, approaching the shape of rhaphides. The chelas are isochelas, palmate and only 11μ in total length, consequently easily overlooked. The shovels at each end are so thin that almost invariably the spicule is found in boiled-out preparations lying on its side, appearing like a sigma.

This species was described by Duchassaing and Michelotti (1864, p. 86) as being *Spongia virgultosa* Lamarck, but as noted above this is so dubious that the authorship should be accredited to the later authors. As such it is the type of the genus *Thalysias*. It was also described as *Tenacia clathrata* Schmidt (1870, p. 56), which is the type of *Tenacia*. Topsent (1889, p. 40) described it as *Clathria copiosa*, Carter (1876, p. 238) described it as *Microciona plana*, Wilson (1902, p. 397) described it as *Clathria jugosa*, another specimen was identified by Duchaissaing and Michelotti (1864, p. 90) as being *Spongia junipera* of Lamarck (1814, p. 444). Topsent (1932, p. 97) redescribes Lamarck's specimen and proves that this is really conspecific with the form under discussion at present. It is very dubious whether *Spongia juniperina* of Esper (1797, p. 192) is conspecific, however, as his description is worthless and his specimen is not available for further study. Although Duchassaing and Michelotti did not place the specimen which they identified as *juniperina* in *Thalysias*, but instead in *Pandaros*, it is not at all typical of this latter genus, and since it appears to be the first species name correctly used with the form in question it would appear proper to employ *juniperina* as the species name. The locality from which the specimen was collected as described by Lamarck is very questionable; though there is some possibility that it was from the Indian Ocean, I would hazard a guess that it was perhaps also West Indian. The various specimens mentioned above as described by Schmidt, Topsent, Carter, Wilson are all from the West Indies, where this is a very common species. The shape of the echinating spicule is distinctive. The fact that four different authors placed this sponge in *Thalysias*, *Tenacia*, *Clathria* and *Microciona*, respectively, is significant of the close relationships between those genera.

This species offers an interesting example of the value of color for taxonomic purposes. As seen in collections there is some variation, and this might lead an observer to the conclusion that the color was of little value, but when it is noticed that the variations have definite causes that may in many cases be ascertained, the factor of color is lifted to the significance that it deserves. If we make due allowance for the presence of spicules or foreign material in the extreme outer layer of the sponge, and for the possibility of pathological condition at the time of collection, color in life becomes an excellent criterion. There still will be left a little doubt, inasmuch as a few species do have more than one color properly present, but such are in a minority. External shape as a factor is obviously very important in large mature specimens that grew without undue pressure from external sources, but in case of very small species, one is always at a loss to know whether they are so as a specific characteristic or merely because of being juvenile. Small size therefore is of especial value only when represented uniformly by a large series of specimens. Consistency is of very great significance, especially when comparison is made between sponges still living or similarly preserved. It is very difficult to use in the case of published descriptions, however, because of the limitations of language when it comes to expressing differences between such subtle sensations as tactile experiences. Consistency is also modified by the amount of foreign material present or absent. If one allows for the factor of foreign material occurring, it is my observation that where large numbers of sponges obviously conspecific are available for handling, that to the fingers the sensation is very similar. It should be reiterated that it is most desirable that sponges should be described from an examination made either during life or very soon after the collection of the specimen in question and before it has been preserved or dried.

THALYSEURYPON new genus

This genus is here established for a group of sponges which are very like *Thalysias,* except that they have no microscleres. They are to *Eurypon* as *Thalysias* is to *Microciona. Eurypon* has very similar spiculation, but is a thinly encrusting form. Identification here should be very careful, because it is more than likely that immature specimens of *Thalyseurypon* would appear (at least superficially) to belong to the genus *Eurypon.* The type of *Thalyseurypon* is here established as *Spongia raphanus* Lamarck (1814, p. 444). Other species not from the West Indies that should be transferred here are *Clathria lipochela* Burton (1932, p. 319), *Thalassodendron brevispina* Lendenfeld (1888, p. 225), *Echinonema flabelliformis* Carter (1885, p. 352), *Tenacia micropunctata* Burton (1932, p. 340), *Echinonema pectiniformis* Carter (1885, p. 353). The West Indian species that should be transferred to *Thalyseurypon* are *Clathria carteri* Topsent (1889, p. 38) and *Clathria foliacea* Topsent (1889, p. 39).

Thalyseurypon foliacea (Topsent) new combination

This species was dredged July 28, 1932, at a depth of 105 meters, south of Loggerhead Key. There were several fragments, but perhaps all from the one colony.

The shape is flabellate, almost that of a fan, reaching a height of 15 cm. The thickness is essentially only between 2 and 3 mm., but the surface is raised by a system of fibers or groups of fibers, each over 2 mm. in diameter. These are chiefly dendritically arranged, but they occasionally anastomose. There are numerous lamellate projections set like erect buttresses against the chief mass, so that the colony becomes quite elaborate. At the upper or distal portion of the colony its width is 10 cm., but at the base it is scarcely 3 cm. The color on collection was pale dull yellowish gray, the consistency spongy. The surface is minutely hispid. Pores and oscules are not visible to the unaided eye. The ascending columns of the skeleton are nearly 1 mm. in diameter and show plainly from the surface which is raised over them. They make a pattern characterized by many more branchings than anastomoses, thus accounting for the increasing measurement of the upper as compared to the basal portion. The ascending columns referred to are fascicular bundles with an oval meshed or elongate trellis-like pattern of their constituent fibers. The fascicles are about 700μ in diameter and enclose elongate meshes about 2 or 3 mm. by 8 mm. The constituent fibers are 60 to 125μ in diameter and enclose meshes 100 to 200μ in diameter, where this is observed in longitudinal sections of the sponge. On the other hand, in transverse views one sees the rather different pattern made by the connecting fibers. These are only about 35μ in diameter and enclose meshes 125μ across. Throughout the sponge the fibers themselves are of pale spongin, longitudinally striated or marked. They contain practically no coring spicules whatever. The only abundant spicule is the sort that by comparison to other similar species one would expect to find coring the fibers, but instead those of this sort also echinate them, and at practically right angles so that one might say the spicules are perpendicular to the tracts. They are tylostyles with heads covered by low lumps, the shaft conical in shape; sample sizes to indicate the size range are as follows: 10 by 190μ, 20 by 280μ, 15 by 365μ. Among them are a very few spicules of the sort ordinarily found echinating the fibers; these also protrude from the tracts, and are 4 by 75μ. A few long thin tylostyles 2.5 by 235μ occur interstitially and near the surface.

It is highly probable that the above is conspecific with the species described as *Clathria foliacea* and *C. carteri* by Topsent in 1889 (p. 39). There are some differences in external form between the three sponges, but not of the most significant nature. Unfortunately Topsent's descriptions are excessively brief. We have, for instance, no evidence that his species had or had not the fascicular main tracts, nor have we adequate details about their spicules. The synonymization can not be made confidently, but it is strongly suggested.

Scope of the Microcioninæ, Part I

There are so very many genera properly referable to the subfamily Microcioninæ, that it is hereby proposed for convenience to divide them arbitrarily into two very artificial groups. It is proposed first to discuss those which, like *Thalysias* and *Thalyseurypon*, are erect or massive sponges rather than thinly encrusting, and then as a second artificial group, those like the genotype of *Microciona*, which are usually very thin forms. It is by no means to be assumed that these two groups represent close interrelationships among themselves as compared to each other; on the contrary, the closest relative of each genus in one group is to be found, not in the same group, but as one of the members of the other artificial category.

The first to be considered of the erect or massive group is *Anomoclathria* Topsent, of which the genotype needs to be established as *Spongia frondifera* Lamarck (1814, p. 445), because Topsent (1932, p. 103) shows that this is conspecific with *Alcyonium opuntioides* Lamarck (1815, p. 164), which latter species was originally made the type of *Anomoclathria*. This is a very interesting genus inasmuch as algal fibers are incorporated and used in lieu of fibers of the sponge. A new genus *Bethia* is here established to have as its genotype *Dictyocylindrus laciniatus* Carter (1879, p. 296), to which should be added as a second species *Raspailia encrustans* Swarchevsky (1905, p. 33). This very interesting genus is a little bit difficult to allocate as to family, because the architecture is not typically that of the Microcionidæ; it is subradiate, hemispherical, and this particular architecture is more characteristic of the Suberitidæ than of any other one family. On the other hand, individual specimens of various species here and there throughout the Microcionidæ show this characteristic. The spiculation is also interesting because, in addition to the normal megascleres of the family, there are diactines present. There are no microscleres unless some minute siliceous "pearls" be so considered (see *Colloclathria* below). A new genus *Cionanchora* is hereby established to have as its genotype *Hymeraphia tuberosocapitata* Topsent (1890, p. 68), to which should probably be referred *Dictyocylindrus anchorata* Carter (1874, p. 22), and *Microciona dubia* Kirkpatrick (1900, p. 136). This genus differs from *Anaata* de Laubenfels chiefly in having anchorate instead of arcuate chelas, plus greater vertical elongation or growth. *Colloclathria* Dendy differs from *Microciona* chiefly in having oval colloidal bodies that appear to be greatly modified isochelas. *Cornulotrochota* Topsent is much like *Microciona* but its chelas are grouped in rosettes and the sponge body is vesicular. *Dendrocia* Hallmann has dermal spicules closely resembling the coring megascleres, and its isochelas have a peculiar shape, with "wings" along the shaft. *Heterectya* Hallmann has megascleres much like the preceding, but lacks microscleres, it is a papillate mass and in many ways resembles *Aulospongus* of the family Raspailiidæ. *Marleyia* Burton might be conceived as being a more mature *Acantheurypon,* but it has a remarkable external resemblance to sponges of the Keratosa. Similarly *Paradoryx* Hallmann might be conceived as being a more mature *Anaata. Protoclathria* Burton is peculiar in that the echinating spicules are acanthostrongyles instead of styles; like *Marleyia,* it lacks microscleres.

Pseudanchinoë Burton, which is very like *Thalysias* except that it lacks the chelas, is represented in the West Indian region by the sponge which was described by Topsent (1889, p. 37) as *Clathria dentata*; it would appear that *Clathria fascicularis* by the same author on page 35 (from the same locality) is almost certainly a synonym and falls to the above. On the basis of published descriptions it would appear that quite a few other species should also be transferred to this genus, including *Clathria assimilis* Topsent (1925, p. 649), *Clathria cælata* Hallmann (1912, p. 212), *Clathria costifera* Hallmann (1912, p. 215), *Clathria inanchorata* Ridley and Dendy (1886, p. 475), *Clathria papillosa* Thiele (1905, p. 449), *Clathria partita* Hallmann (1912, p. 223), *Spongia sartaginula* Lamarck (1814, p. 383), *Clathria scotti* Dendy (1924, p. 352), and *Clathria toxitenuis* Topsent (1925, p. 655).

The genus *Ramoses* is here established to have as genotype *Clathria pauper* Brøndsted (1927, p. 3). It is very difficult to decide in what family to put this interesting sponge, which has its fibers cored by somewhat spiny spicules as well as being echinated by the ordinary commonplace acanthostyles. It may well be argued that it should be incorporated in the above-mentioned family Acarniidæ, and this may indeed be correct, but the superficial resemblance to the Microcionidæ is such that with some hesitation it is for the present left here. No microscleres are reported. *Wilsonella* Carter is perhaps a synonym of Microciona but has "quasi-diacts" and perhaps sigmas. It is interesting to note that this genus was put in the Zoological Record, and also in Scudder's "Nomenclator" as *Wilsonia.*

Scope of the Microcioninæ, Part II

The second artificial group of the subfamily Microcioninæ as here considered comprises genera characterized by species chiefly of very thin encrusting form, frequently only the thickness of one erect spicule. Where the sponge in question is clearly an adult, this habitus is of taxonomic value, but in many cases we can not be sure that the specimen was not a juvenile. The first genus of this type to be considered is *Anaata* de Laubenfels, which has the principal megascleres slightly spined, the usual acanthostyles as echinating spicules, and tylostyles in the ectosome with arcuate chelas as microscleres. The genotype has unusual oscular structure. *Paradoryx* of the Microcionidæ of erect growth also has arcuate chelas but does not have the dermal spicules so conspicuously differentiated. *Anaata* should receive *Halichondria pustulosa* Carter (1882, p. 285), *Halichondria scabita* Carter (1885, p. 112), *Clathria elegans* Vosmaer (1880, p. 152) (if the brief published description of that species be reliable), and possibly also *Ophlitaspongia meyeri* Bowerbank (1877, p. 456). Also three species originally described as of the genus *Hymedesmia* should be transferred to this genus: they are *pennata* Brøndsted (1932, p. 12), *proxima* Lundbeck (1910, p. 81), and *pugio* Lundbeck (1910, p. 94). A new genus

Arndtanchora is hereby established to have as genotype *Leptosia sirventi* Topsent (1927, p. 12), to which should also be added probably *Hymedesmia exigua* Kirkpatrick (1907, p. 273). The megascleres of this genus are quite typical of the Microcionidæ, but the microscleres are very peculiar, there being anchorate chelas and also arcuate chelas with a peculiar central enlargement to the shaft. There are also sigmas of two sizes. The name is given in respect to the eminent zoologist, Professor Dr. Walther Arndt of the University of Berlin. *Damoseni* is hereby proposed as a new generic name to have as genotype *Hymeraphia michælseni* Hentschel (1911, p. 351) and possibly also *Microciona fascispiculifera* Carter (1880, p. 44), and *Clathria spongodes* Dendy (1921, p. 69). In this also the megascleres are quite typical for the family Microcionidæ, but the microscleres consist of very peculiar sigmas or sigmoid chelas. They differ from ordinary chelas by having at each end a bifurcate branching, not recurved as in chelas, otherwise they might be called bidentate. *Dictyociona* Topsent is very like *Microciona*, but the principal spicules are somewhat spined as well as the echinating ones. *Hymedesmia oxneri* Topsent (1928, p. 256), on the basis of published description, should be transferred to this genus. There are three species originally described as of *Microciona* that apparently should be transferred here—these include *clathrata* Whitelegge (1907, p. 493), *heterotoxa* Hentschel (1929, p. 891), and *pyramidalis* Brøndsted (1924, p. 466). *Dictyociona* should further receive *Eurypon asodes* de Laubenfels (1930, p. 27) and four species originally described by Stephens (1916) as of the genus *Eurypon*. These are *acanthotoxa* (p. 238), *ditoxa* (p. 239), *microchela* (p. 240) and *tenuissimum* (p. 240). *Discorhabdella* Dendy has very peculiar microscleres, including anisochelas and odd astrose forms.

Epicles Gray has smooth styles as principal spicules, those of the ectosome are not conspicuously differentiated, the echinating ones are quite commonplace and microscleres are absent. *Eurypon* Gray has the principal spicules somewhat acanthose and the dermal megascleres definitely set apart, but otherwise is very much like *Epicles*; the two genera were established simultaneously, but, if adjudged synonymous, usage would suggest dropping *Epicles* in favor of *Eurypon*. The abundance of species that are intermediate in nature between the two types set forth above points toward the decision to synonymize them. On the other hand, the eminent spongologist Topsent separated species answering to the description of the genotype *Hymeraphia clavata* Bowerbank (1866, p. 143), of *Eurypon* as a separate genus *Acantheurypon*, because of their difference from the genotype (*Hymedesmia radiata* Bowerbank, 1866, p. 149) of *Epicles*. It would appear that when doing so *Eurypon* and *Epicles* were regarded as synonyms with a diagnosis answering to that of *Epicles*. If a second genus is needed, as Topsent argued (1927, p. 15), *Eurypon* as distinct from *Epicles* will serve. There are two West Indian species which should now be transferred to *Epicles*. They were described by Bowerbank (1874) as of the genus *Hymeraphia*, the first on page 246 as *coronula* and the second on page 253 as *simplex*. Other species, not West Indian, that need to be transferred to *Epicles* include *Hymeniacidon clavigera* Bowerbank (1858, p. 296), *Hymeraphia graphidiophora* Hentschel (1911, p. 350), *Vioa hancocci* Schmidt (1862, p. 78), and *Hymeraphia thielei* Hentschel (1912, p. 377). There are several species that should be transferred to *Eurypon* in the restricted sense here employed. They include *Hymeraphia distincta* Thiele (1903, p. 956), *Hymeraphia hispidula* Topsent (1904, p. 164), *Acantheurypon incipiens* Topsent (1928, p. 293), *Hymeraphia lendenfeldi* Hentschel (1912, p. 378), *Acantheurypon mixtum* Topsent (1928, p. 292), *Hymeraphia pilosella* Topsent (1904, p. 163) (the type of *Acantheurypon*), *Hymeraphia rhopalophora Hentschel* (1912, p. 386), *Acantheurypon scabiosum* Topsent (1927, p. 15), *Hymeraphia similis* Thiele (1903, p. 957), *Hymeraphia spinispinosa* Topsent (1904, p. 162) and *Hymeraphia tetrastyla* Hentschel (1912, p. 379).

Hymantho Burton has the three megasclere sorts typical of Microciondiæ, with toxas as microscleres. To this genus should be transferred *Microciona tenuis* Stephens (1915, p. 443) and *Microciona lævis* Bowerbank (1866, p. 127). *Isociona* Hallmann is like the above, but the principal spicules are spiny, often in isodictyal reticulation, and the microscleres also comprise palmate isochelas. *Jia* de Laubenfels has the usual three megasclere sorts, palmate isochelas, toxas and remarkable J-shaped microscleres. *Leptochelastra* is a new genus, here proposed to have as genotype *Hymeraphia toureti* Topsent (1894, p. 30). In this genus the principal spicules are tylostyles with peculiar double heads and the accessory spicules are acanthotylostyles with spines pronouncedly recurved. The description adds that there are isochelas and asters and it is much to be regretted that they are not more thoroughly described and figured. It is a West Indian species. *Leptosastra* Topsent has megascleres as in the preceding genus and odd spiny pyriform microscleres. *Leptosiopsis* Topsent also has the assortment of megascleres found in the two genera preceding, but its microscleres are anisochelas of three weirdly deformed varieties.

Microciona Bowerbank has, of course, the typical megascleres and architecture. Its microscleres are toxas and palmate isochelas. A West Indian species that should be referred to this genus is *Hymeraphia affinis* Topsent (1889, p. 43). Another very interesting species for consideration here, as it occurs in the region immediately north of the West Indies, is that which was first described as *Spongia prolifera* by Ellis and Solander (1786, p. 179), and later as *Spongia ostracina* by Rafinesque (1818, p. 150). This species under the name of *Microciona prolifera* has subsequently been ascribed to other authors who have described it better, but Ellis and Solander must be credited; from these better descriptions and my own personal abundant experience with the species in the field and in the laboratory, I should say that it was one very difficult to classify, as between *Microciona* and *Thalysias*. It is not a typical *Microciona* because it varies decidedly in the direction of *Thalysias*, but in view of the very large amount of literature in which it is referred to by the preceding name, I propose for the present at least that it be left in *Microciona*. Other species that should be referred to *Microciona* include *Leptosia grisea* Hentschel (1911, p. 353), *Suberites dianæ* Schmidt (1875, p. 116), and four species originally described in the genus *Clathria*. They are *cleistochela* Topsent (1925, p. 650), *gradalis* Topsent (1925, p. 651), *meandrina* Ridley (1884, p. 614) and *mortensenii* Brøndsted (1924, p. 143). It is further worthy of consideration that the following species possibly should be transferred into *Microciona*—*Esperiopsis obliqua* George and Wilson (1919, p. 148), *Scopalina toxodes* Schmidt (1868, p. 26) and that described as *Amphilectus armatus* by Svarchevsky (1906, p. 342). Since there is already a *Microciona armata* Bowerbank (1862, p. 779), this latter species would then need a new name, for which I would propose *svarchevskyi*.

Quizciona, new genus, is here proposed to have as genotype *Microciona heterospiculata* Brøndsted (1924, p. 465). This genus has the ordinary *Microciona* megascleres and chelas, and has in addition exceedingly peculiar microscleres for which no appropriate special name seems at present to be available. There is a relatively large oval disc-like structure with apparently enlarged rim and at either end one incurved blunt-ended prong. This is perhaps an exceedingly modified chela. I propose that it be termed an aspidate chela. *Tricheurypon* Topsent is much like *Epicles*, but with the addition of rhaphides as microscleres; of this the genotype, *Hymeraphia viridis* Topsent (1889, p. 43) is a West Indian species. A new genus *Wetmoreus* is hereby proposed to have as genotype *Microciona novæzealandica* Brøndsted (1924, p. 463). This species has megascleres rather typical of the family Microcionidæ, the palmate isochelas are commonplace, but in addition to these there are peculiar sigmoid chelas that perhaps are to be regarded as extensively modified arcuate forms. The name is given in respect to the eminent zoologist, Dr. Alexander Wetmore of the U. S. National Museum.

Other generic names which need consideration in connection with the family Microcionidæ include *Aaata* de Laubenfels, a synonym of *Anaata*. *Abila* Gray; there were two genera of the same name by the same author in the same article, of which the first is a synonym of *Abilana* in the family Raspailiidæ, while the second is a synonym of *Hymantho,* discussed above. *Acantheurypon* Topsent, of which the genotype needs to be established as *Hymeraphia pilosella* Topsent (1904, p. 153), is a synonym of *Eurypon* proper, differing only from a concept of *Eurypon* that would include *Epicles,* which see. *Antherochalina* Lendenfeld it should here be noticed is to be regarded as a synonym of *Microciona* because Burton (1934, p. 558) establishes the genotype as being *crassa* of Lendenfeld (1887, p. 786), and because Burton goes on to indicate that this is of the so-called genus *Clathria.* This being unrecognizable, the transfer is hereby proposed to *Microciona,* with a proviso that it is quite likely that the genus *Thalysias* might possibly be more appropriate. A further redescription of the species is much to be desired. *Echinonema* Carter is a synonym of *Thalysias. Paracliona* Topsent is a synonym of *Epicles. Rhaphidophlus* Ehlers is a synonym of *Thalysias. Sophax* Gray is a synonym of *Microciona. Stylotellopsis* Thiele is a synonym of *Eurypon. Tenacia* Schmidt is a synonym of *Thalysias. Thalassodendron* Lendenfeld is unrecognizable.

YVESIINÆ new subfamily

This subfamily is hereby established for sponges in many respects very like those of the genus *Microciona,* and particularly of the family Microcionidæ, but differing in that the special dermal spicules are spined. Apparently this subfamily is not at all represented in the West Indies. In view of the lack, or apparent lack, of echinating spicules, it might be well to attribute this subfamily to the family Amphilectidæ instead of to Microcionidæ. The typical genus, *Yvesia* Topsent, has arcuate chelas, and the other well-known one, *Pseudoclathria* Dendy, does not. To these should be added a new genus *Crellancistra,* to have as genotype *Hamacantha integra* Topsent (1904, p. 222), which has acanthostyles over styles and very odd shaped microscleres, perhaps to be regarded as diancistras.

OPHLITASPONGIIDÆ de Laubenfels

This family was established for a group which differs from the Microcionidæ, on paper at least, chiefly in that the fibers are echinated by smooth rather than by spiny styles. While this seems at first to be but a slight difference, it will be noticed that the transition in echinating spicules from spiny to smooth is relatively uncommon in other groups of the Pœcilosclerina mentioned above and does represent a very distinct step in the direction of the order Halichondrina as represented by the family Axinellidæ and genus *Axinella.* There are even species and genera referred here to Ophlitaspongiidæ (such as *Artemisina*) which approach very closely to the Suberitidæ and, as in that family, the tylote modification is very common indeed in the Ophlitaspongiidæ. Microscleres are almost always present. The architecture is frequently fibrous, with the echinating spicules producing an almost plumose or axinellid appearance.

The oldest genus referred here (but dubiously so) is *Clathria* Schmidt (1862, p. 57) of which the genotype must be recognized as *Spongia coralloides* Olivi (1792). This genus is not suitable as the type of a family, however, because of the great uncertainty of its real nature. It has been very commonly assumed by most authors in recent years that *Clathria* possessed fibers echinated by acanthostyles, but Schmidt in his description makes no mention of other than smooth monaxons. Topsent (1925, p. 645) discovered at Naples a sponge which he identified as being *coralloides* of Olivi, which, according to his description, also has no acanthostyles. The situation is rendered still further complicated by the fact that Schmidt does not mention any microscleres at all, perhaps indicating that none were present, but perhaps merely that he did not see fit to mention them; we are therefore left in the dark as to what other generic names, later or earlier, are or are not synonymous with *Clathria* of Schmidt. While it is probable that it belongs to the family Ophlitaspongiidæ as here defined, closer allocation is impossible.

This family is represented in the vicinity of the Dry Tortugas by no less than four genera.

AXOCIELLA Hallmann

The sponges of this genus are hispid and usually ramose. The fibers are cored with smooth spicules (usually styles but occasionally strongyles), echinated by smooth styles and the microscleres are palmate isochelas and toxas.

In addition to the species to be described below, four originally described in the genus *Ophlitaspongia* need to be transferred to the genus *Axociella*. They are: *confragosa* Hallmann (1912, p. 255), *eccentrica* Burton (1934, p. 560), *membranacea* Thiele (1905, p. 450), *thetidis* Hallmann (1920, p. 779), *thielei* Burton (1932, p. 322). *Axociella calla* de Laubenfels (1934, p. 16) is West Indian.

Axociella spinosa (Wilson) new combination

This sponge was collected on June 25, 1932, west of the White Shoal; an encrusting specimen came from 15 meters and a ramose specimen from 19 meters, otherwise close together.

The encrustation is about 2 mm. thick, on a bivalve mollusk's shell. The ramose specimen is over 11 cm. high, having very numerous branches 3 to 5 mm. in diameter, each branch very crooked and knobby. The color in life was a bright vermillion, fading to gray in alcohol. The consistency is toughly spongy. The surface is pilose. Pores and oscules can not be made out. The surface projections are approximately 1 mm. high and about 0.5 mm. apart, or less. The encrusting specimen is made of a basal plate of spongin from which dendritic fibers of spongin arise. They are some 280μ in diameter at the base and about half that at the summit, having given off about three to six branches as they grew, which branches, however, seldom if ever anastomose. A small amount of protoplasmic material is interspersed between the fibers. In the ramose specimen similar fibers are vaguely reticulate, due to anastomoses. All the megascleres appear to be subtylostyles, but a great variation in size and proportion exists. It is difficult to say that any one particular shape or sort is localized at the surface, or in the fibers, or echinating, because interstitial specimens show all the variations, and those in and on the fiber show similar size and shape ranges. For example in one small area I find the following dimensions: 1.5 by 160μ, 3 by 215μ, 8 by 200μ, 5 by 340μ. As indicated above there are many spicules loose in the flesh, others coring the fibers, others echinating the fibers and some at the surface, usually erect, where they almost or quite make plumose tufts. The microscleres are palmate isochelas, 15μ long, abundant in the encrusting specimen but rare in the ramose specimen.

It would seem that this species was first described by Wilson (1902, p. 396) as *Microciona spinosa*; Wilson's specimen was from Puerto Rico in the West Indies. The nearest relative to *spinosa* seems to be *Amphilectus hispidulus* Ridley (1884, p. 419) from Australia. What little we know about the latter corresponds rather closely with *spinosa*, but it does not seem appropriate to regard the two as conspecific in view of the fact that Ridley's description is excessively brief; some of the items which he omits may very likely be different from those described by Wilson and those present in the Dry Tortugas specimen.

DESMACELLA Schmidt

This genus is characterized by a simple spiculation of megascleres that are tylostyles and only sigmas for microscleres. This genus has been represented from the West Indies by five specific names. *Annexa* of Schmidt (1870, p. 73), as noted below, is here referred to as a new genus. *Jania* of Verrill (1907, p. 338) incorporated algæ in its skeleton. *Vagabunda* Schmidt (1870, p. 53) is inadequately described, so specimens may not safely be identified with it. The West Indian specimen which Dendy (1924, p. 345) identified as being conspecific with that described by Wilson (1904, p. 139) from the Pacific Ocean as *Tylodesma vestibularis* has megascleres only 6 by 140μ, whereas Wilson's specimen has megascleres 8 by 240μ to 16 by 630μ; furthermore the sigmas in Dendy's specimen were very large, 44 to 100μ, whereas Wilson's were very small, only 12 to 36μ. It would appear that a new specific name is needed for Dendy's specimen and I therefore propose that it be called *Desmacella dendyi*. The fifth follows.

Desmacella pumilio Schmidt

Plate 22, fig. 1.

This specimen was dredged from 1047 meters, on July 30, 1932, in the Gulf Stream about half-way between the Dry Tortugas and Cuba.

It is an amorphous mass covered with irregular lumps and depressions and evidently was more or less encrusting in habit. The mass is 5 mm. thick, 20 mm. wide, 40 mm. long. The color is pale gray. The consistency is slightly compressible, rather easily torn. There is no evidence of ectosmal specialization, nor can pores be found. In one place there is a group of about six oscules, each nearly 1 mm. in diameter. The endosome is minutely "crumb-of-bread" with very numerous microscleres embedded in the lamellate tissues around the gross canals and chambers. The megascleres are in some confusion, but here and there are vaguely aggregated into tracts about 200μ in diameter. The megascleres in them are not tightly packed together, most of the pointed ends are toward the surface of the sponge, and at the surface there is some tendency for the spicules to spread out like little bouquets. The megascleres are tylostyles, of which the following are representative measurements: 9 by 530μ, 10 by 770μ, 15 by 945μ, 17 by 1400μ. The microscleres are sigmas 30 to 40μ in length of chord, but very often close to the median 35μ.

This species is probably cosmopolitan in deeper water, and the surmise is here made that the majority of those specimens described as *Desmacella vagabunda* (for instance see de Laubenfels, 1932, p. 64), should really be regarded as *pumilio* on the basis that this latter species is more nearly recognizably described in Schmidt's original paper than the more commonly used *vagabunda.*

EUCHELIPLUMA Topsent

This very remarkable genus has typically one type of style in the fibers with tylostyles echinating them, the microscleres comprise isochelas, placochelas and sigmas that are almost diancistras. The architecture is plumose. The one specimen hitherto described came from the Atlantic Ocean near the north coast of Africa. In contrast the Dry Tortugas specimens have only tylostyles, have microscleres rather differently shaped and have remarkable external form, as will be described below.

Eucheliplumа congeri new species

Plate 22, fig. 3.

Two specimens were dredged July 30, 1932, south of Loggerhead Key, at a depth of 1047 meters; this was about half-way between the Dry Tortugas and Cuba. One of these, the Holotype, is U. S. Nat. Mus. Cat. No. 22517.

Each had a round stem 2 mm. in diameter that had broken, so that the original length is unknown. It was probably very short because in each specimen the shape flares out almost at once, approaching the form of a hemisphere with the flat or slightly convex side uppermost, directly opposite the point of attachment of the above mentioned stem. On this nearly level surface, here interpreted as upper, occur a large number of processes 200 to 300μ in diameter and 1 to 4 mm. long. In some places they are crowded so closely together that they touch each other. The largest specimen reaches a total diameter of 9 mm., a height of 13 mm. to the tips of the processes, and one of 9 mm. to their bases. The smaller is about half as large. The color is nearly white. The lateral surface is gleaming, smooth and even. The consistency is cartilaginous. Only a very few surface openings were found, they are about 120μ in diameter and may have been inhalent or exhalent. The dermal processes are densely packed with megascleres, of which the points are directed away from the mass of the sponge below. The main body of the species contains very numerous spicules with points almost always directed toward the surface. The protoplasmic structures are very fine grained, there being no canals in evidence that are much larger than the abundant flagellate chambers, which latter are spherical, 60μ in diameter. The megascleres are tylostyles with heads only very faintly swollen, cylindrical shafts and rather hastate points. They range from 9 by 553μ to 13 by 1004μ, averaging rather closer to the larger size. There are vast numbers of microscleres. No simple isochelas were made out for certain, but some spicules as seen in profile appear to be of this type, although it must be admitted that they might be placochelas. The latter, which is the typical sort of microsclere present, runs from 13 to 15μ in total length, and about 4μ in greatest width; the fimbriations were seen only dimly. There are very abundant sigmoid microscleres, 18 to 21μ chord, which bear some resemblance to diancistras because there is a knife-like edge protruding along the concave side of each.

The other species, *E. pristina* Topsent (1909, p. 18), has megascleres nearly three times as thick as those of *congeri,* and much more tylote. There were palmate isochelas, and the habitus resembled a string with a ball at one end. *Congeri* is so named in respect to the eminent student of Diatoms, Mr. Paul Conger of Washington, D. C.

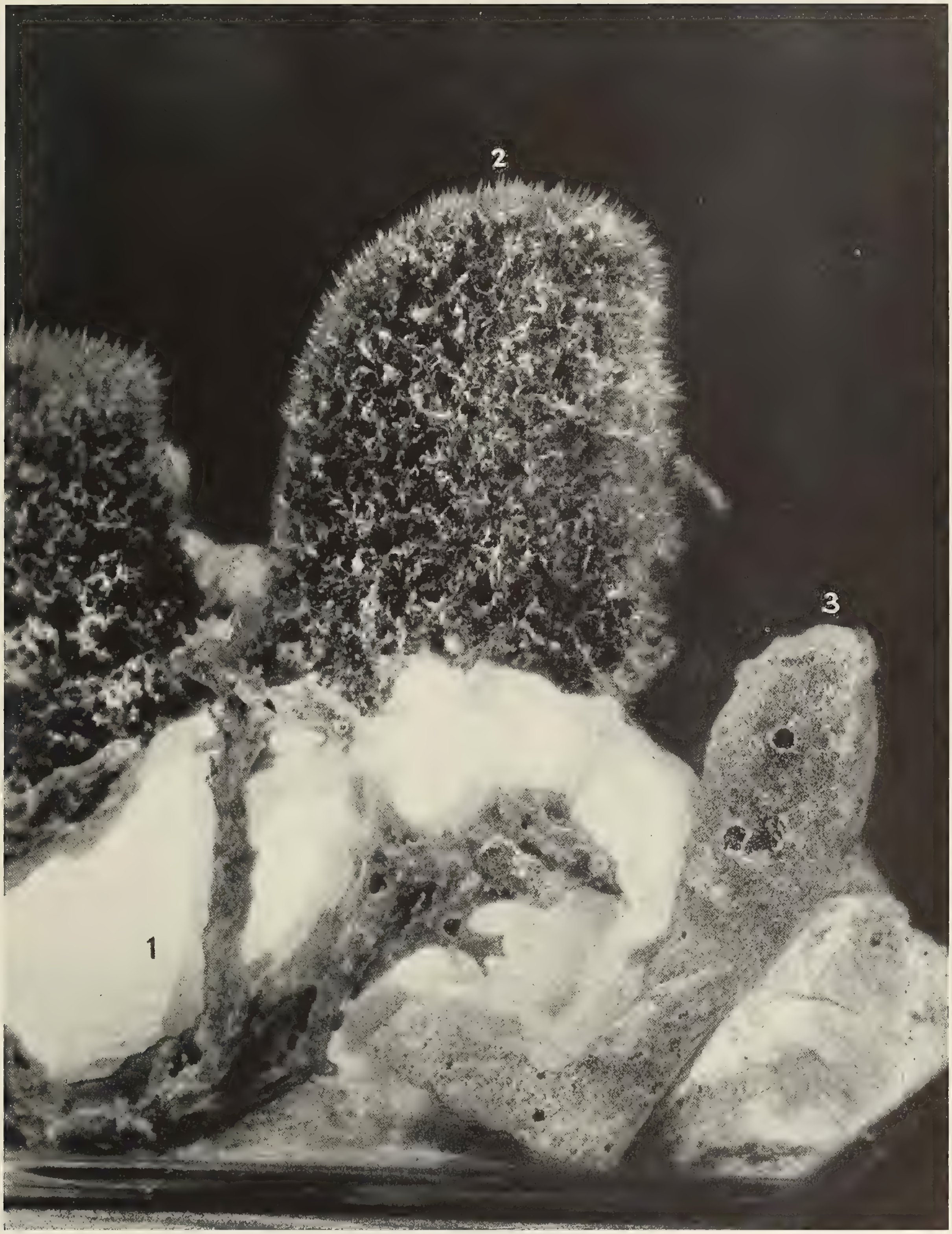
MYCALE Gray

This genus has fibers cored and echinated by smooth monaxons that are frequently subtylostyles. The microscleres always include palmate anisochelas usually of two or three different size ranges, plus sigmas. Of the very numerous species described here, about twenty-seven also have toxas, and perhaps these might profitably be separated as the genus *Carmia* Gray. In *Mycale* proper the architecture is frequently rather cavernous. The species described as *Mycale acerata* by Kirkpatrick (1907, p. 280) should be transferred to the genus *Oxymycale.* In addition to the Dry Tortugas species to be described below, three others have been described from the West Indian region, all originally placed in the genus *Esperia*; their names are *immitis* Schmidt (1870, p. 57), *lævis* Carter (1882, p. 291) and *renieroides* Schmidt (1870, p. 57.)

Mycale angulosa (Duchassaing and Michelotti) new combination

Plate 14, fig. 2; Plate 15, fig. 1.

This species is certainly very common at depths of 17 to 25 meters, in the vicinity of the Dry Tortugas, and perhaps at slightly greater depths also. The total mass of the sponge is occasionally merely massive to vaguely ramose, but if conditions are at all favorable it would appear that this species grows up to the shape of hollow cylinders with walls about 1 cm. thick, around a central hollow 3 cm. in diameter, the total outside diameter being therefore about 5 cm. and the total height about 12 cm. Whether or not this ideal shape is attained, the architecture is peculiarly trabeculate. The trabeculæ may be simple, about 1 mm. in diameter, forming a reticulation with meshes from 3 to 5 mm. across. Some of the tracts continue at right angles to the surface of the sponge, and then protrude as digitate extensions some 7 mm. beyond the region that may be assumed to represent the surface of the sponge. The distal ends of these processes are often bifid or trifid. On the other hand, however, the reticulation may not be simple but trellis-like. The groups are then 2 to 3 mm. in diameter and surround slightly larger meshes. Each trellis-group is aggregated from trabeculæ only 250μ in diameter apiece. While on paper this sounds very different from the simple structure, to the eye the general effect is astonishingly similar. There may be from one to four of the hollow cylinders. The color of the exterior is dull maroon red, but the endosome is rather yellowish or orange in color. The maroon color extends to a greatly varying depth and in some specimens there is scarcely any of the more yellowish color, even in the very interior of the sponge. In many specimens apparently many of the cells are dead and the protoplasm removed by maceration, so that one notices the brownish color of the fibers. I found only one specimen from shallow water that was well provided with flesh, it bore a general resemblance to an excessively conulose keratose sponge. Typically in *angulosa* there are merely thin pieces of protoplasm suspended in frames made of the above fibers, so that the architecture must be described as extremely cavernous. Other species of this genus sometimes show a tendency to this very peculiar architecture, as for instance: *bellabellensis* Lambe (1905, p. 14), from the Pacific coast of North America, in which, however, the dimensions are many times coarser. It is almost needless to say that neither oscules nor pores can be made out in a structure of this sort. The consistency is softly spongy. In the above-mentioned sheets of protoplasm framed by the trabeculæ, microscopical examination reveals flagellate chambers about 50μ in diameter, rather oval than spherical. They are difficult to study because of the large amount of foreign matter usually also present. There are a few inclusions over 1 mm. in diameter and many only 5 to 15μ. There are also many scattered or



Sponges, approximately life size, photographed alive, under water. Figure 1, *Callyspongia vaginalis*. This shows the solid ramose form, less common than the more typical tubular form. Figure 2, *Mycale angulosa*. Compare with Plate 16, figure 1, which shows the same species, but a dead specimen, against a light background. Figure 3, *Haliclona subtriangularis*. Compare carefully with Plate 8 to note the very different surface and oscular characteristics.

interstitial spicules in these fleshy sheets as well as in the fibers. One of the most remarkable items in regard to this species is its amazingly copious production of slime. Specimens of this sort on one occasion completely filled a large tub with ropey slime, twenty-five to fifty times the volume of the sponges themselves. Most of the fibers are densely packed with spicules but contain also at least a little spongin. They are in some specimens 60 to 250µ in diameter, but in a few specimens are much coarser, say 750 to 1000µ. Near the upper portion of the colony these tracts become quite plumose, and right at the surface are fan-like or axinellid. They branch occasionally at very acute angles and anastomose almost as often. The spicules are remarkably elongate tylostyles, the heads being so prolonged as to resemble sausages. The points also are very elongate, tapering to almost ultimate fineness. A very common size is 2 by 200µ but some are at least as small as 1 by 100µ and the others as large as 4 by 400µ. No evident difference separates the interstitial spicules from those of the tracts or fibers. The microscleres are peculiarly narrow palmate anisochelas, 15µ in greatest length, again sometimes as short as 11µ, and seldom more than 3µ in greatest width. They are exceedingly uncommon and are found only after careful search. The sigmas, about 45µ long, are even rarer, and in fact were found in only a very few specimens, nevertheless they must be regarded as typical of the species.

This species was first described as *Pandaros angulosa* Duchassaing and Michelotti (1864, p. 89). Whitfield (1901, p. 49) described specimens from the West Indian region as *Hircinia purpurea* new species. Note that Hyatt (1877, p. 550) had earlier used the name *Hircinia purpurea* for a sponge in the same order with *Hircinia*. Arndt (1928, p. 144) identified specimens of this sponge as of *Mycale fistulosa* Hentschel (1911, p. 292), an Australian species which Burton (1928, p. 119) referred in synonymy to *Mycale spongiosa* Dendy (1896, p. 15). If published descriptions are reliable, particularly with regard to illustrations as to the shape of chelas, it would certainly seem to me that the Australian and West Indian species should be regarded as far from conspecific.

SCOPE OF THE FAMILY

Within the family of Ophlitaspongiidæ there exists a small group of genera showing considerable evidence of mutual interrelationship and almost sufficient difference from typical genera of the family to be worthy to be regarded as a subfamily. If this were established, it would need to be called Artemisininæ. In this group the items that may be referred to as plumose tracts are frequently so closely appressed side by side that the compact structure of the Suberitidæ is simulated. This group is represented from the West Indian region by the sponge described by Duchassaing and Michelotti (1864, p. 95) as *Acamas laxissima* which it is hereby proposed should be established as the type of the genus *Acamas*, inasmuch as the other species (*violacea*) is utterly unrecognizable. Inasmuch as the name *Acamas* was preoccupied in 1808 for a mollusk, it is hereby proposed that the new name *Acamasina* be substituted. It has precisely the spiculation of *Artemesina*, that is to say, the principal spicules are tylostyles and the megascleres are palmate isochelas and toxas that are microspined near the end. It differs from *Artemisina* in being much less suggestive of Suberitid and more nearly a typical member of the Ophlitaspongiidæ; it therefore also approaches the genus *Axociella*, which has very similar spiculation except that in the latter the toxas are not microspined. The form and color of *laxissima* would seem to indicate that it was not very closely related to either *Artemisina* or *Axociella*. It was a black mass with conspicuous yellow tubercules.

The other genera of this little group include, as mentioned above, *Artemisina* Vosmaer, which is a ball-shaped sponge of cork-like consistency; *Camptisocale* Topsent which has anisochelas, and *Phelloderma* Ridley and Dendy which has isochelas of very peculiar shapes and the principal spicules peculiarly polytylote.

A very peculiar sponge belonging to the family Ophlitaspongiidæ from the West Indian region was described by Schmidt (1870, p. 55) as *Desmacidon titubans.* Topsent in 1928 placed it in his subgenus *Anomomycale,* and de Laubenfels (1934, p. 17), proposed in view of its very distinctive spiculation that it be regarded as a full genus having as genotype the above mentioned species. *Arenochalina* Lendenfeld is very much like *Mycale,* except for the addition of enormous quantities of sand. It is here retained as a separate genus distinct from *Mycale* only provisionally. *Axosuberites* Topsent represents the Ophlitaspongiidæ well exemplified in other ways, but completely lacking microscleres. There is much spongin and there are two localized sorts of tylostyles, one special dermal sort and the other coring the fibers. It will be noticed that the ramose specimen described above as *Axociella spinosa* might possibly have been put in this genus. *Axocielita* new genus is hereby proposed to have as genotype *Microciona similis* Stephens (1915, p. 441), to which may also be referred *Microciona aceratoobtusa* Carter (1887, p. 67). This genus has the spiculation of smooth styles with palmate isochelas and toxas as microscleres which is characteristic of *Axociella,* but differs from that genus in being persistently exceedingly thin. Undoubtedly very young specimens of *Axociella* would be completely confused with this new genus. In this connection it is interesting to note that the encrusting specimen described above as *Axociella spinosa* would have been put in this genus but for its association with the ramose form, which association indicated that it was merely a juvenile and not an adult.

Carmia Gray differs from typical *Mycale* only very slightly, in that it has toxas in addition to the spiculation of *Mycale.* The following species, first described as *Mycale,* should be transferred here: *bolivari* Ferrer Hernández (1914, p. 35), *macginitiei* de Laubenfels (1930, p. 26), *madraspatana* Annandale (1914, p. 154), *microchæla* Ferrer Hernández (1929, p. 169), *raphidiophora* Hentschel (1911, p. 291), *retifera* Topsent (1928, p. 104). The following species first described as of the genus *Esperella* should be transferred here: *albicans* Topsent (1893), *erythræna* Row (1911, p. 340), *fascifibula* Topsent (1904, p. 201), *fibrexilis* Wilson (1894, p. 279), *hamata* Topsent (1892), *mollis* Topsent (1893), *ridleyi* Lendenfeld (1888, p. 211), *simonis* Ridley and Dendy (1886, p. 339), *suezza* Row (1911, p. 338), *sulevoidea* Sollas (1902, p. 213), *toxifer* Dendy (1895, p. 16). The following species first described as of the genus *Esperia* should be transferred here: *borassus* Carter (1876, p. 317), *cunninghami* Carter (1882, p. 300), *lanx* Vosmaer (1882, p. 42), *lorenzii* Schmidt (1862, p. 56), *syrinx* Schmidt (1862, p. 56). Others to be transferred here include *Hymeniacidon ægogropila* Johnston (1842, p. 119, the genotype of *Ægogropila*), *Spongia contarenii* Martens (1824), *Demacidon copiosa* Norman (1869, p. 299), *Raphiodesma fallaciosum* Bowerbank (1882, p. 163), *Raphiodesma minima* Waller (1880, p. 97), *Desmacidon similaris* Bowerbank (1874, p. 319), *Raphiodesma sordida* Bowerbank (1874, p. 230), *Hymeniacidon subclavata* Bowerbank (1866, p. 209). The type of the genus is the sponge described as *Hymeniacidon macilenta* by Bowerbank (1866, p. 176).

Caulospongia Kent is exceedingly close to *Axosuberites* (mentioned above) but differs in having only one sort of tylostyle and a very peculiar elaborate structure. Still another member of the family Ophlitaspongiidæ which lacks microscleres is *Echinochalina* Thiele; it has also this characteristic which is almost sufficient to rule it out of this family, that many of the coring spicules are oxeas, that is to say diactinal, instead of merely monactinal styles. There are, however, monaxons present among the coring spicules, and the echinating spicules are, as typical of the family, smooth styles. It would appear that *Axinella chalinoides* Carter (1885, p. 358) should be transferred to this genus and also four species originally described in *Ophlitaspongia*, as follows: *axinelloides* Dendy (1896, p. 39), *digitiformis* Row (1911, p. 351), *gabrieli* Dendy (1896, p. 38), and *tubulosa* Hallmann (1912, p. 292). An exceedingly puzzling genus requires consideration at this place. It is *Echinoclathria* Carter, of which the genotype must be regarded as *Spongia leporina* Lamarck (1814, p. 444) because Topsent (1932, p. 101) shows that this was conspecific with *Ophlitaspongia tenuis* Carter (1885, p. 355), which was established as the type of *Echinoclathria* by Burton (1934, p. 562). As an indication of the difficulty in allocating *Echinoclathria* one may note that Burton in the above-mentioned reference on page 558 gives it as a synonym of *Ophlitaspongia*, but in the same article on page 562 gives it as a synonym of *Clathria*, in the sense that *Clathria* represented (as it probably does not) a genus of sponges having spiny echinating spicules. Both Carter's description of *tenuis* and Topsent's redescription of Lamarck's *leporina* indicate that this sponge is the type of a genus having no microscleres, and one might expect therefore that *Axosuberites* of Topsent would fall into synonymy to *Echinoclathria*. Against this we may put the fact that some of the spicules of this peculiar genus show an incipient spination which might be used as an argument for transferring the group to the Microcionidæ. It also shows in places a tendency toward an isodictyal reticulation, which is not ophlitaspongid. Four species originally described as in this genus should instead be transferred to *Axociella*; they are as follows: *carteri* Ridley and Dendy (1886, p. 476), *hjorti* Arnesen (1920, p. 21), *ramosa* Hallmann (1912, p. 277) and *rotunda* Hallmann (1912, p. 282).

In the genus *Echinostylinos* Topsent, the chelas are arcuate and there are sigmas as there are also in the genus *Esperiopsis* Carter, of which latter, however, the chelas are palmate. To the genus *Esperiopsis* should perhaps be transferred three species which Bowerbank in 1875 described as of the genus *Halichondria*. They are: *compressa*, *crassa*, and *rigida*. Dendy (1921, p. 82) described a sponge as *Hymedesmia lipochela*; its only spiculation consists of tylostyles of two sizes, the entire sponge being exceedingly thin. That it is far removed from *Hymedesmia* and its relatives may be noted from the lack of any dermal diactines. Instead it is closer to the genus *Prosuberites*, from which, however, it is separated and its transfer into the Ophlitaspongiidæ indicated by the fact that some of the spicules seem quite clearly to be echinating. A still further point of separation from *Prosuberites* is the tendency of portions of the sponges to grow up in leaf-like processes. This in turn, together with the spiculation, suggests resemblance to *Caulospongia* described above. By way of cutting the gordian knot representing the problem of correct location of this species in any hitherto described genus, it is here proposed to erect for it as genotype a new genus *Fasubera*. A genus *Folitispa* is here proposed to have as genotype *Hymedesmia lævissima* Dendy (1921, p. 81). There are smaller dermal tylostyles and larger principal ones as in *Suberites*; the microscleres are technically anchorate chelas, but of unusual shape. Should further study disclose that similar microscleres are really present in *lipochela* but merely overlooked, then of course these two new genera would be regarded as synonyms. *Gomphostegia* Topsent is in many ways like *Mycale*, especially as to microscleres, but some of the megascleres have the exotylote modification. *Hypsispongia* de Laubenfels has as microscleres diancistras, also palmate anisochelas and sigmas. (See de Laubenfels 1935, p. 5.) A new genus *Labisophlita* is hereby proposed to have as genotype *Esperiopsis forcipula* Lundbeck (1905, p. 17), a sponge which has in general the spiculation of *Echinostylinos* (mentioned above) with the addition of forcipes. Were the sponge also to possess special dermal diacts it would be congeneric with *Forcepina*, which is placed in the family Myxillidæ. This, I take it, may be employed as good evidence for the close relationship of sponges to each other and the simultaneous relationship of one given genus or species to several other sponge sorts which among themselves seem to differ greatly. *Merlia* Kirkpatrick has very peculiar microscleres, and in general is a most interesting sponge, but the reader is referred to the well-known works of Kirkpatrick on this subject for more details (*e.g.* Quarterly Journal Microscopical Science, vol. 56, Part 4, June 1911). Two genera which are referred to the Ophlitaspongiidæ with some doubt, but are clearly rather closely related to each other, are *Microtylostylifer* Dendy and *Microxistyla* Topsent. In the former the microscleres are very small tylostyles, while in the latter they are centrotylote diacts. The megascleres are much as in other genera of the family. *Monanchora* Carter has microscleres that are unguiferate chelas with many teeth.

A new genus, *Mycalecarmia*, is here proposed to have as genotype the species described as *Esperilla lapidiformis* by Ridley and Dendy (1886, p. 338). This genus has the typical megasclere spiculation of the Ophlitaspongiidæ, has anisochelas and occasionally rhaphides (here regarded as relatively insignificant) and rather less cavernous architecture than typical *Mycale*. *Mycale* also differs from this new genus in having sigmas added in the spiculation, while in *Carmia* there are also toxas added. *Mycalecarmia* should receive the following species which were first described as of the genus *Mycale*: *gaussiana* Hentschel (1914, p. 61), *lilliei* Dendy (1924, p. 337), *monanchorata* Burton and Rao (1932, p. 329), *rossi* Hentschel (1914, p. 59), and *thaumatochela* Lundbeck (1905, p. 39). It should receive the following species which were first described as of the genus *Esperella*: *crassa* Dendy (1896, p. 17), *cylindrica* Whitelegge (1906, p. 467), *dendyi* Row (1911, p. 331), *littoralis* Topsent (1891, p. 537), *mammiformis* Ridley and Dendy (1886, p. 337), *modesta* Lambe (1894, p. 118) [because *modesta* was already employed in *Esperella* by Schmidt (1862, p. 57), name has since been used a third time in the genus by Babić (1922, p. 267) and a a new name is needed for that of Lambe, for which I therefore propose *babići*; the new name will be necessary for Babić's species], and *varpachowskii* Swartschewsky (1906, p. 346). It should receive the following species which were first described as of the genus *Esperia: diaphana* Schmidt (1870, p. 57), *foliata* Fristedt (1885, p. 47), *lanugo* Schmidt (1875, p. 118), *magellanica* Ridley (1881, p. 117), and *stolonifera* Merejkowsky (1879, p. 22). The following other species should also be transferred here: *Clathria lovéni* Fristedt (1887, p. 458) and *Chalinula ovulum* Schmidt (1870, p. 38).

Mycalopsis Topsent is somewhat like *Esperiopsis* but the chelas are of three sizes and the largest occur in rosettes. In *Ophlitaspongia* Bowerbank, the type of the family, the only microscleres are toxas. Whereas many species originally described in *Ophlitaspongia* really deserve to be transferred to *Axociella*, on the basis of published description, there have been two such transfers previously made without apparent justification, since in structure, spiculation, and in all other respects the species involved appear to be typical *Ophlitaspongias*. These are: *flabellata* Topsent (1916, p. 167), and *nidificata* Kirkpatrick (1907, p. 274). I propose that they be left in *Ophlitaspongia*, of which the semiaxinellid or plumose spicule tracts are so very characteristic. A new genus *Okadaia* is hereby proposed to have as genotype

Amphilectus unguiculatus Dendy (1921, p. 58), a species characterized by tylostyles and peculiar straplike sigmas with toothed ends. To this with some hesitation are added the following, all first described as in *Esperiopsis; viridis* Kieschnick (1898, p. 59), *rigida* Lambe (1892, p. 60), *vancouveri* Lambe (1892, p. 68), and *quatsinoensis* Lambe (1892, p. 69). A very strong possibility must be noted that the latter three are all conspecific with each other, coming as they do from the same locality on the West coast of North America; *viridis* is Australian and *unguiculatus* is from the Indian Ocean. This genus name is given in respect to the eminent zoologist Professor Yaichiro Okada, of Tokyo Normal College, Tokyo, Japan. The genus *Paresperella* Dendy has frequently been regarded as congeneric with *Mycale* from which it differs chiefly in that it not only has very large sigmas but these with serrated ends. Instead of being most closely related to *Mycale*, however, I would suggest relationship to *Rhaphidotheca* and *Pozziella*, because some of the specimens of *Paresperella* show an incipient tendency to the exotylote modification of the megascleres which is carried to a greater extent in *Pozziella*. This latter genus also has one serration on the end of each of its macrosigmas. The tendency of the megascleres to be exotylote is carried to a still greater extent in *Rhaphidotheca*, which furthermore has microscleres exceedingly like those of *Paresperella*, except for the lack of the larger sigmas. *Pozziella* Topsent is mentioned above.

Pseudoesperia Carter needs to have its genotype established as *Esperia parasitica* Carter (1885, p. 108). More information is desirable as to the exact nature of the microscleres of this genus, which would appear to be anchorate anisochelas. *Rhaphidotheca* Saville Kent is mentioned above. *Sceptrella* Schmidt is a puzzling genus placed here near *Rhaphidotheca* on the assumption that its peculiar dermal spicules are exotylote. Since they are also nodally acanthose there is some resemblance to *Latrunculia*. The microscleres are, however, suggestive of the relationship to *Mycale* and more specifically to *Paresperella*, especially if the megascleres be compared to those of *Pozziella* and the microscleres to those of *Pseudoesperia*. *Sceptrospongia* Dendy, which also has exotyles and anisochelas, indicates still further the probability of relationship among the group that would also include *Sceptrella*, *Pozziella*, *Pseudoesperia*, *Rhaphidotheca* and *Paresperella*. *Sigmaxia* Hallmann has the typical semiplumose structure of the Ophlitaspongiidæ, but in addition to the typical styles has sinuous strongyles, which is not to be expected in this family; the microscleres are sigmas and rhaphides. *Sigmaxinella* Dendy is closely related to the above, but the diactines are oxeas and not sinuous. The architecture is even more suggestive of the relationship to the Axinellidæ, which I believe to be true of the entire family Ophlitaspongiidæ in general. *Sigmotylotella* Burton appears at first glance to be very close indeed to *Desmacella*, but many of the spicules are very peculiar and it seems wise to follow the above-mentioned author in retaining it as a separate genus. *Sigmatoxella* a new genus is hereby proposed to have as genotype *Desmacella annexa* Schmidt (1870, p. 53). This is like *Toxemma* but has tylostyles as megascleres and plumose architecture. It is like *Desmacella* with the addition of toxas to the ordinary microscleres. In other words, there are tylostyles as the principal spicules, sigmas and toxas for microscleres. Two species originally described as in the genus *Biemna* should be transferred here; they are *chevreuxi* Topsent (1890, p. 32) and *humilis* Thiele (1903, p. 944). *Syringella* Schmidt, which like *Axosuberites* has only monactinal megascleres and no microscleres, is plumose in a manner to approach the family Raspailiidæ; it should receive *Raspailia rigida* Ridley and Dendy (1886, p. 483). *Tetrapocillon* Brøndsted, otherwise not exceptional, has exceedingly peculiar microscleres. The sigmas present in *Tylosigma* Topsent are also very strange and characteristic. The type of this latter genus, originally described as *Hymedesmia campechiana* Topsent (1889, p. 43), is a West Indian species. *Wilsa* de Laubenfels is like the above-described new genus *Labisophlita*, except that the chelas are palmate and the sigmas in some cases are exceedingly large. *Zygherpe* de Laubenfels has the usual megascleres, plus diancistras. *Zygomycale* Topsent has for microscleres the remarkable combination of isochelas and anisochelas.

Other generic names which need to be included here include the following: *Ægogropila* Gray is a synonym of *Carmia*. *Carnleia* of Burton, on the basis of published descriptions, would appear to be a synonym of *Desmacella*, inasmuch as it has the same fibrous structure of tylostyles with sigmas as associated microscleres. It has rhaphides also among its microscleres, which may be regarded as sufficient basis for keeping this a separate genus, but only by systematists who would take what would appear to me an exaggerated view of the systematic importance of microscleres. Burton usually tends rather to the opposite extreme of minimizing their value. The puzzle as what to do with *Clathria* Schmidt has been discussed above in connection with the family Ophlitaspongiidæ in general. *Corybas* Gray is a synonym of *Mycale*, as are also *Esperella* Vosmaer and *Esperia* Nardo. *Noronha* Kirkpatrick is a synonym of *Merlia*. *Plectispa* Lendenfeld is a synonym of *Echinoclathria*. *Plectodendron* Lendenfeld is a synonym of *Caulospongia*. *Raphiodesma* Bowerbank is a synonym of *Mycale*. *Seriatula* Gray is a synonym of *Ophlitaspongia*. *Tylodesma* Thiele is a synonym of *Desmacella*.

CLADORHIZIDÆ new family

All the sponges of this group have more or less remarkable external shape. They frequently possess symmetrical, long, arm-like projections, and stalks or stems are common. Many of the structures are really beautiful. This in general is a group of sponges found in the deeper parts of the ocean and, judging from the literature, it is not found in the West Indian region. The principal spicules are usually, but not quite always, monactinal. There are characteristically queer-shaped microscleres, often chelas with unexpected protuberances and constrictions near their ends. The compact semiplumose architecture suggests at once the Suberitidæ or Axinellidæ, and also very particularly certain members of the above-mentioned family Ophlitaspongiidæ, specially those represented by the genus *Artemisina*. The general symmetry in some cases suggests relationship to the Podospongiidæ, but this is here interpreted as being convergent evolution, both families having had different ancestry, but due to their location in the great depths having been permitted to assume symmetrical form. The differences between the various genera are chiefly in the way of diverse shapes of chelas, or of other microscleres.

Scope of the Family

The first genus of the family as here considered is *Asbestopluma* Lundbeck, of which the genotype must be understood as being *Cladorhiza pennatula* Schmidt (1875, p. 119). Others are *Axoniderma* Ridley and Dendy, *Chondrocladia* Thomson, *Cladorhiza* Sars, *Crinorhiza* Schmidt. A new genus, *Exaxinata*, is hereby proposed to have as genotype *Cladorhiza oxeata* Lundbeck (1905, p. 97), which is not typical of the family in question, inasmuch as the principal spicules are diactinal (oxeas), instead of being monactinal. *Lycopodina*, which was proposed as a subgenus by Lundbeck (1905, p. 58), is here suggested as being worthy of full generic rank. Of it the type should be regarded as being *Asbestopluma lycopodia* Lundbeck (1905,

p. 62). *Meliiderma* Ridley and Dendy has one of the most noteworthy spiculations in the family. A new genus *Raoa* is hereby proposed to have as genotype *Cladorhiza tridentata* Ridley and Dendy (1886, p. 343), which has a very peculiar hollow cup-like shape. It has tylostyles as principal spicules and as microscleres, the sort of anisochela characteristic of Cladorhizidæ, together with sigmas. As indicated in the specific name of the genotype, in that sponge the chelas have only three prongs at each end, as is common in shallow water sponges but less common in the family now under consideration. The generic name is given in respect to the eminent zoologist, Dr. H. S. Rao of Calcutta, India. *Trochoderma* Ridley and Dendy is a synonym of *Axoniderma.*

AMPHILECTIDÆ new family

The genera referred to this new family are characterized by lack (or apparent lack) of any echinating spicules at all, which lack is relatively uncommon in the order Pœcilosclerina. The existence in many of them of acanthostyles might indicate that the echinating spicules had merely been incorporated into the fibers. There would seem to be close connection with Ophlitaspongiidae, in which latter family many of the echinating spicules are practically indistinguishable from those incorporated in or coring the fibers. Again, the smoothly reticulate structure of the fibers would seem (at least superficially) to indicate close relationship to the Haplosclerina from which, however, there is sharp difference in regard to spiculation. This family is moderately well represented in the West Indian region, at least two genera occurring in the vicinity of the Dry Tortugas.

PANDAROS Duchassaing and Michelotti

The genotype is here established as *Pandaros acanthifolium* Duchassaing and Michelotti (1864, p. 90). This genus is characterized by the possession of plumose branches with very elaborate dermal structures. The fibers are not at all echinated and contain a great variety of monactinal spicules, which, with many intergradations, vary from acanthostyles to styles scarcely at all spined to smooth tylostyles. As noted below, the type and only species is not only West Indian but a sponge that occurs in the vicinity of the Dry Tortugas.

Pandaros acanthifolium Duchassaing and Michelotti

This specimen was collected July 14, 1927, from a depth of about 2 meters, near Bird Key.

It is a massive sponge perhaps 10 cm. high by 6 cm. in diameter. The color in life was a dark maroon, almost black. It stained the original label that was put in the alcohol with the sponge a maroon so nearly black that it rendered the writing all but illegible. Subsequent changes of alcohol have also been stained more or less. The consistency is very spongy, even in a dry fragment which was preserved for study in that condition, which is very remarkable. Fairly numerous sponges when wet are very spongy, but only the commercial varieties as a rule are still of this consistency after drying. Another genus in which this persistent sponginess is noted is *Agelas.* The surface gave pronounced evidence of subdermal cavities about 1 mm. or more in depth, into which the rubbery smooth dermis about 18μ thick sank after removal of the specimen from the water. Duchassaing and Michelotti's specimen had high, elaborate, much-branched conules. The Dry Tortugas specimen is not quite so elaborate, but has high conules rising 4 to 6 mm. above the surface with tops that are frequently bushy. The abundant pores are about 100μ in diameter. Due to the cavernous surface the oscules can not be made out with certainty. They may have been very small, or perhaps had been closed by sphincters. The endosome is very cavernous; there are not only the chambers visible to the naked eye, but others about 40 to 65μ, which are noted with the microscope. These were first assumed to be the flagellate chambers until the latter were discovered clustered around them. The flagellate chambers proper range from about 22 to 28μ in diameter and presumably have very short apopyles emptying into the above-mentioned microscopic chambers. The fibers, which are of clear yellow spongin, are very unevenly distributed. In places they make an elongate network, with meshes only some 50μ in diameter. Elsewhere they may be as much as 1.5 mm. apart. They are generally 50 to 85μ in diameter. The spicules are arranged in the fibers in very irregular fashion, not, as is often the case, in parallel rows; they are often at direct right angles within the tracts, sometimes they give a semiplumose appearance suggestive of the family Ophlitaspongiidæ. They appear to be essentially of only one category, and may be described as styles 8 by 392μ. There are considerable variations in shape, however, particularly in the presence or absence of a faint tylote swelling at the head. A very few of them are as much as 560μ long. Occasional acanthose modifications found in Duchassaing and Michelotti's specimen seem wanting, at least on the basis of study made up to the present time, from the Dry Tortugas specimen.

This would appear to be the only species in the genus, and the genus apparently is confined to the West Indian region.

TOXEMMA Hallmann

In this genus the megascleres are monactinal, always styles in species already described, but subtylostyles are to expected. They core tracts or fibers that make a more or less reticulate pattern. The microscleres include significantly both toxas and sigmas, and it so happens that rhaphides are found in most specimens. The genus, as hitherto reported, has been found only from the vicinity of the Indian Ocean (India and Northern Australia).

Toxemma tubulata (Dendy) Hallmann

I found a massive specimen of this growing in the moat at Fort Jefferson on June 28, 1932, and a small encrusting specimen on a boulder just below low tide, on Bush Key Reef, June 30, 1932.

It is a very amorphous mass about 6 by 9 cm. in the first instance mentioned above. It was dirty yellow in life. Its consistency is so soft and fragile that it falls to pieces when one attempts to handle it. The surface is lumpy, irregular, but provided with a smooth dermis, which can, however, be removed only by taking with it some of the underlying endosome. There are tangentially placed and also confused megascleres in this above-mentioned ectosome. One dubious structure that may have been an oscule is about 3 mm. in diameter, but much algæ was growing through the sponge, and this aperture may merely mark the former location of an algal stem. The endosome is somewhat like "crumb of bread," with a few rather vague spicular tracts containing each 7 to at least 24 rows of spicules, total diameter about 30 to 60μ. Most of the spicules, however, are merely strewn in confusion throughout the flesh surrounding the gross chambers. The megascleres are styles, varying in diameter from 4 to 7μ, and having a rather constant length of about 270μ. There are also exceedingly numerous microscleres present, of which the most abundant are rhaphides, 45 to 105μ in length and well under 1μ in diameter. The sigmas and toxas are equally slender; the latter are about 45µ in length, the sigmas range from as small as 15 up to 30µ.

Dendy (1905, p. 155) described *Desmacella tubulata* from the Indian Ocean for which Hallmann (1917, p. 673) erected the genus *Toxemma.* According to the published description, Dendy's specimen differs from the Dry Tortugas one almost exclusively in being cylindrical in external shape. The agreement as to color, consistency and spiculation is so very great indeed, that I am reluctant to regard the West Indian species as separate merely because of the slight difference in external form, especially since the Dry Tortugas sponge was growing near the surface and therefore was so subjected to environmental stress that a fundamental tendency to cylindrical habitus may have been modified by the circumstances.

Scope of the Family

Other genera here assigned to the Amphilectidæ include the following: *Allantophora* Whitelegge has some diactines among its megascleres and has sigmas and rhaphides for microscleres. *Amphilectus* Vosmaer has as microscleres only palmate isochelas. *Biemna* Gray is like *Allantophora*, but lacks the diacts and is much more fibrous. *Brøndstedia* Burton, to which should be transferred the sponge described as *Esperiopsis artemisinæ* by Brøndsted (1932, p. 7), has sigmas and palmate isochelas for microscleres. *Evomerula* new genus is here established to have as genotype *Hamacantha agassizi* Topsent (1920, p. 11). Its principal spiculation is very simple, consisting merely of smooth styles, but the microscleres comprise peculiar diancistra-like sigmas together with commonplace sigmoid forms. To this genus should also be transferred *Vomerula esperioides* Ridley and Dendy (1886, p. 337) and *Hamacantha carteri* Topsent (1904, p. 218). The above-mentioned genotype is a West Indian species. *Hamacantha* Gray may be a synonym of *Vomerula*, but is more probably unrecognizable. *Isopenectya* Hallmann has no microscleres; some of its megascleres are spiny. *Keratylum* new genus is here proposed to have as genotype *Suberites capillitium* Topsent (1892, p. 130). The spicules in this genus seem to be only tylostyles imbedded in the fibers, none of them being echinating. The architecture in general is reticulate. The resemblance to *Caulospongia* of the Ophlitaspongiidæ is very great, but that genus has echinating spicules. The resemblance to *Stylotrichophora* (see below) is even greater, but in that genus many of the spicules are only styles and there are oxeote microscleres. Aside from the fact that the spicules are the same as those of *Suberites* there is very little to connect this sponge with that genus. The new genus *Labacea* is here proposed to have as genotype the specimen which Burton (1931, p. 343) described as *Clathria juncea*, possibly, but not certainly, equal to *Spongia juncea* of Lamarck. This South African species has exactly the spiculation of *Pandaros* with the addition of toxas that are microspined near the end, as in the genus *Artemesina.* The architecture is in some respects, however, very different from that of *Pandaros*, in that the exaggerated conules are absent; instead the surface is minutely hispid. The form is an erect branching cylinder, and in addition to the spongin fibers there is in places an isodictyal reticulation. With a great deal of hesitation I also refer to this genus the sponge described as *Clathria oxeiphera* by Ferrer Hernández (1921, p. 171). The genus *Ligrota* is here established to have as genotype *Clathria lobata* Vosmaer (1880, p. 151). This genus is very closely related to *Labacea*, having practically the same megascleres, with the exception that some of the smooth spicules are diactinal, that is to say, oxeas instead of merely styles. The toxas among the microscleres also have the same peculiar microspined tendency at the ends, but in addition to them there are present also palmate isochelas, and perhaps, in some instances, sigmas. In addition to the genotype, I assign here also, though with some hesitation, *Microciona spinarcus* Carter and Hope (1889, p. 101). Another closely related genus here is *Paresperia* Burton, which lacks the toxas, and of which all the megascleres (as is characteristic of the family) are monaxon. *Pellinula* Czerniavsky is ill-known, but is probably congeneric with the later *Protoesperia* Czerniavsky. *Pseudohalichondria* Carter has palmate isochelas and odd microscleres that may be deformed chelas or sigmas, each with a row of spines on the convex side. *Stylotrichophora* Dendy has only rhaphides and dubiously toxas as microscleres. *Tenaciella* Hallmann has palmate isochelas and toxas; it should receive in synonymy the species described as *Desmacidon rimosa* by Ridley (1884, p. 609). *Ulosa* new genus is hereby proposed to have as genotype *Spongia angulosa* Lamarck (1814, p. 376). This is characterized by having fibers with only smooth styles but having for interstitial spicules not only smooth styles but also strongyles, and presumably has no microscleres. To this new genus should be transferred *Strongylacidon intermedia* Burton (1934, p. 550), and *Stylotella topsenti* Arnesen (1920, p. 18). *Vomerula* Schmidt is a West Indian species to the extent that its genotype, *Vomerula tenda* Schmidt (1880, p. 82), and *V. tibicien* Schmidt (1880, p. 83) are both from that region. Its microscleres are spined toxas and diancistras. *Ysila* new genus is hereby proposed to have as genotype *Esperiopsis schmidti* Arnesen (1903, p. 9); another species that should probably be referred here is *Esperiopsis scotia* Topsent (1915, p. 38). This genus is characterized by having smooth styles in the fibers, of course there are no echinating spicules, and the microscleres are arcuate isochelas and sigmas. This spiculation, one may notice, is almost that of *Echinostylinos* of the Ophlitaspongiidæ, but this latter genus has that plumose plan which is lacking in the Amphilectidæ.

DESMANTHIDÆ new family

This family is here erected for certain genera of lithistid sponges which, in addition to the deformed spicules called desmas, have as principal spicules monaxons that are usually smooth styles; for this reason the family comprises genera that belong in the Microcioniformes. They may represent the lithistid modification of almost any one of the genera of the families here put in that family.

The typical genus of the family is *Desmanthus* Topsent, which has only smooth styles and elaborate tetracrepid desmas. Its genotype *Aciculitis incrustans* Topsent (1889, p. 32) is a West Indian species. The other genera referred here include *Desmatiderma* Topsent, which has placochelas, palmate isochelas, and two sizes of sigmas; and *Helophlœina* Topsent, which has palmate anisochelas and strange strongylote spicules with girdling constrictions and swellings.

HALICHONDRINA Vosmaer

This order has been established for sponges that differ from those in the Haplosclerina by having special ectosomal skeletons and often two or more categories of megasclere. The genera assigned here, however, do not have the spicule sorts so definitely localized as they are in the Pœcilosclerina, but each of several sorts may occur in each of several locations. In the Halichondrina there are often monactines, diactines, or both, in sponges otherwise obviously closely related, so that one must conclude that the nature of the megascleres has less significance than in other orders. Unlike either of the two above-mentioned orders, microscleres are very rare; there are rhaphides, which are the least significant of all microscleres, and these may be spined.

The families assigned here are the Axinellidæ, Halichondriidæ, Semisuberitidæ, Hymeniacidonidæ and Monanthinæ. The last mentioned is provided for genera of lithistid sponges that, by inference, are considered as being more closely related to the other families mentioned in this paragraph than they are to the other lithistid varieties. The Hymeniacidonidæ are fleshy sponges somewhat resembling the keratose genera. The Semisuberitidæ are only weakly characterized, and in general are of dubious systematic relationship. The Halichondriidæ are definitely connected through the genus *Ciocalypta* to the Axinellidæ, so that Topsent (1928, p. 43) puts the two families together as his Axinellidæ. Hentschel (1923, p. 408) would change the name Axinellidæ to Ciocalyptidæ. On the other hand, *Halichondria* itself, for all its resemblance to *Ciocalypta*, has also much superficial resemblance to *Adocia* of the Pœcilosclerina and even to *Haliclona* of the Haplosclerina, whereas *Axinella* shows noteworthy resemblance to the plumose Ophlitaspongiidæ of the Pœcilosclerina and to all the many families (discussed below) which have radiate architecture.

AXINELLIDÆ Ridley and Dendy

The tendency to the interchangeable occurrence of monactines and diactines, as mentioned for the order, is especially conspicuous in this family. Typical members do not possess any microscleres at all, but rhaphides may be present. The megascleres are frequently much curved or sinuous. The most noteworthy characteristic of all is the pronouncedly hispid ectosome. Actual specializations within the sponge, differing from the peripheral regions, are usual, and the architecture is always very plumose unless warped and obscured, as for example by large caverns. It is common for the very central region of the sponge to have an elongate specialization of some sort, called "axial" from its location. This axial region is sometimes denser than the contrasting peripheral zones, or again it may be set off by possessing a different arrangement of spicules. It is here proposed that the Axinellidæ be divided into two subfamilies, the Axinellinæ and the Higginsiinæ. The Axinellinæ, which will be considered first, differ from the other subfamily in that they lack microscleres. Two species of this subfamily occur near the Dry Tortugas.

PTILOCAULIS Carter

This genus is typical of the family Axinellidæ in that the megascleres may be either monactine or diactine or both and that the structure is very plumose. There is also an axial specialization, which in this genus is relatively solid. The most remarkable thing about it is the external shape, which resembles clusters of feathers. The elongate dermal projections are very numerous and they overlap. Another characteristic which may or may not be of significance is the frequency with which the pointed terminations of the spicules are arrived at by series of successively smaller steps, instead of by smoothly tapering to a point. The type of the genus, *Ptilocaulis gracilis* Carter (1883, p. 321), is a West Indian species. It resembles a Corinthian capital and has principally monactinal megascleres. The genus *Pitalia* Gray is interesting in comparison here. Were we better acquainted with it, it might prove to be synonymous, but must at present be treated as unrecognizable.

Ptilocaulis marquezii (Duchassaing and Michelotti) new combination

This specimen was collected July 5, 1928, in a depth of about 8 meters, near Bird Key Reef.

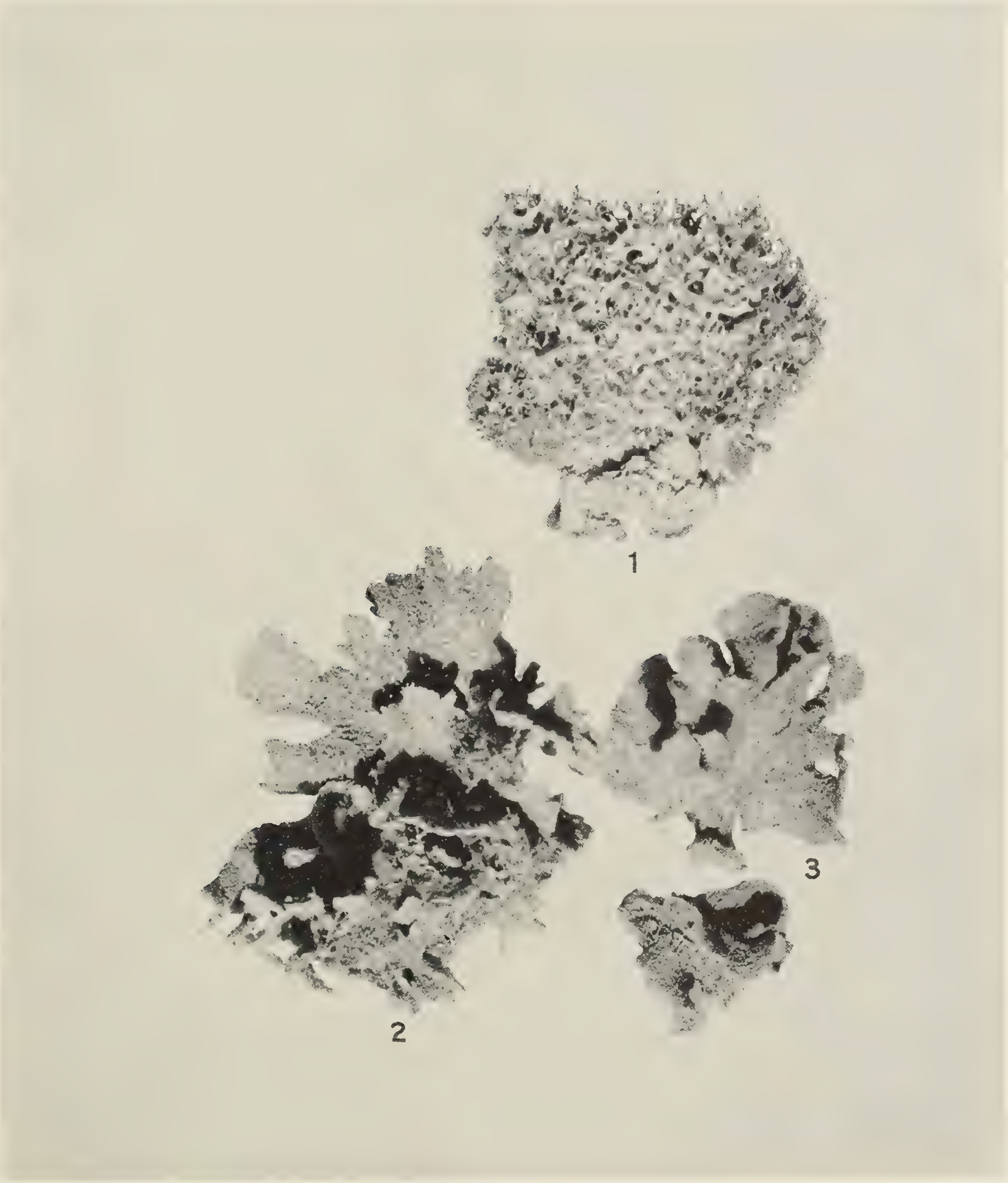
The shape is a very elaborate, irregular cylinder. The color in life was red-brown as to ectosome, over an endosome of pale red. The consistency is weak and crumbling. The surface is mossy in appearance, with many irregular projections up to about 2 mm. or more in length. The oscules and pores are not readily made out. The structure of the endosome is that known as "crumb of bread," with gross chambers from 200 to 1000μ in diameter. The spiculation may have been basically plumose but this is considerably obscured by the above-mentioned cavernous structure, the result being that the spicules are principally crowded into the thin sheets that surround these chambers, which sheets average only about 100μ in thickness. It may be surmised that the spicules originally were mostly styles. Perhaps a few may have been oxeas or strongyles, but a great majority have undergone the modification of their ends which consists of a succession of smaller and smaller units until they seem sharp-pointed. This is found here and there throughout the family Axinellidæ, but in an extreme development in this genus.

Lamarck (1814, p. 372) described a species as *Spongia lacera*, which to judge from the redescription by Topsent (1930, p. 17) may be the species at present under consideration. It certainly belongs to the genus *Ptilocaulis* and should be transferred here, but the synonymy as to the species is uncertain in view of the lack of data in some respects. The first species name that may be referred with certainty to the Dry Tortugas specimen is that denominated *Spongia marquezii* by Duchassaing and Michelotti (1864, p. 40). This species was later described by Schmidt (1870, p. 45) as *Plicatella aulopora*. This species differs from *Spongia spiculifera* (Lamarck, 1814, p. 449) in being less provided with styles and reticulation than that species, and also by having some difference in color. *Spongia echidnæa* (Lamarck, 1814, p. 448) may be close here, but is not well known and is certainly more reticulate. The latter two species were transferred to *Ptilocaulis* Topsent (1932, pp. 108-111). *Gracilis* Carter (1883, p. 321), the type of the genus, may be another synonym, but decision seems to be impossible at present in view of lack of sufficient data in regard to it. It is West Indian. It has much in common with *Ptilocaulis rigidus* of Carter (1883, p. 322), which also is perhaps a synonym.

TEICHAXINELLA new genus

The type of this new genus is here established as the new species to be described below, *Teichaxinella shoemakeri*, and should include also several other species of sponge originally described as of the genus *Axinella*. These all differ from that genus, however, in that they lack the special axial condensation. This is also wanting in the genus *Pseudaxinella* Schmidt, but for a very different reason, namely, that in *Teichaxinella* the external habitus suppresses any possibility of axial condensation, and the same might otherwise be present. The spiculation always includes monactines, and in the genotype and in several others diactines are present, too. Perhaps the most distinctive single characteristic is the tendency to thin lamellate shape. Thin sheets are sometimes so placed that they abut against one another at right angles, resembling walls about a room.

Most of the species transferred here are from the vicinity of the Indian Ocean, but the first to be mentioned, namely, *Axinella cinnamonea* Schmidt (1862, p. 61), was a Mediterranean sponge. It has no diactines and some of the monactines seem to be tylostylote. The color verged upon reddish. A second species to be transferred here is *Axinella labyrinthica* Dendy (1889, p. 88), an Indian Ocean species, bright red-orange in color with typical spiculation. A third is *Axinella proliferans* Ridley (1884, p. 618), also from the Indian Ocean, the color was salmon pink, and



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Mycale angulosa*. Figures 2 and 3, *Teichaxinella shoemakeri*.

this also lacks the diactines. *Axinella vermiculata* Whitelegge (1907, p. 510) may possibly, but not certainly, also belong in this new genus, in which case there would be five species allocated here.

Teichaxinella shoemakeri new species

Plate 15, fig. 2.

About half a dozen large fragments of this species were dredged June 26, 1932, together with a few small pieces evidently broken off from the others. It seems probable that at least five different sponges are represented, but the possibility remains that they all represent only one colony. All the specimens were taken at a depth of 70 meters southeast of Loggerhead Key, and the largest of these, U. S. Nat. Mus. Cat. No. 22450, is the holotype.

This species occurs in thin sheets 0.7 to 1.2 mm. thick, with crenated edges. These plates often stand at right angles to one another, making a T-shaped cross-section. The color on collection was pale yellow. The consistency is elastic, fairly tough. The surface is even, but minutely hispid by reason of projecting spicules, which are, however, not densely crowded together as in a plush, but somewhat scattered. With a microscope the surface is seen to be covered in many instances, but not all, by a darkly staining zone, some 80µ thick; this appears to be entirely due to foreign material accumulated where it is in evidence. The species is lipostomous. The endosome is bread-like with small gross chambers and spicules and soft parts arranged as best they may around them. Inasmuch as many of these cavities are less than 70µ in diameter they may be flagellate. Here and there, in sections, one sees a bit of what resembles spongin, but this can not be identified with certainty. No definite organization into fibers stands out. The special dermal spicules, which, as mentioned above, are perpendicular to the surface, are ordinarily from 5 to 7µ in diameter and attain a total length of at least 1200µ, but the longest ones are always found already broken at the time of collection so that the maximum length can not be stated, nor is it certain that they are all styles, though one may surmise this to be the case. There are two sorts of endosomal spicules each approximately as numerous as the other. The first to be mentioned is a style that is frequently rather sharply bent near the blunt end. Its size range is from about 12 by 510µ to 15 to 470µ. The other sort is diactinal, varying from usually oxeote to rarely strongylote in shape. The largest are about 4 by 200µ only, and all sizes from that on down may be found.

Some relationship is indicated clearly to all the species mentioned above in connection with the generic diagnosis, but the surmise is here made that the closest of all is *proliferans* from the Indian Ocean. That differed, however, in lacking the diactines, and in the fact that many of its styles were very much larger (that is to say, up to 45µ thick) than the largest in *shoemakeri*. The species name is given in respect to Mr. Clarence R. Shoemaker, Assistant Curator, Division of Marine Invertebrates, of the U. S. National Museum, Washington, D. C.

Scope of the Subfamily

Other genera typical of the subfamily Axinellinæ comprise the following: *Anacanthæa* Row, like *Ptilocaulis*, has very many spicules provided with the very peculiar termination described above. The surface, however, is not so elaborate, but is divided into special pore areas or polygonal plates. *A. rea* de Laubenfels (1934, p. 11) is West Indian. *Auletta* Schmidt has a remarkable, almost sycon, habitus with central cloaca. It has great styles of two sizes and flexuous strongyles in an axial condensation. *Axiamon* Hallmann has both straight and sinuous coring styles, also has oxeas, and is hispid with special dermal styles. It should receive in synonymy two species described by Brøndsted in 1924 as of the genus *Hymeniacidon.* These are *erecta* (p. 479) and *novazelandiæ* (p. 477). *Axinectya* Hallmann has smaller axial styles and enormous extra-axial ones. *Axinella* Schmidt, the genus that typifies the family, has both styles and oxeas, with axial specialization and exceedingly plumose, hispid structure. The genotype should be understood as being *Axinella polypoides* Schmidt (1862, p. 62). *Desmacidon nodosus* Kieschnick (1896, p. 532) should be transferred to this genus. This genus has been recorded several times from the West Indies, for the following seven species: *A. appressa* Verrill (1907, p. 340) is perhaps a valid species; it is described as hispid, red, ramose, with only styles. *A. clava* of Schmidt (1870, p. 61) is described from the Dry Tortugas, but its entire description comprised only thirty-seven words and it only can be regarded as unrecognizable, which latter is also true of his *A. mastophora* described on the same page. *A. reticulata* Ridley and Dendy (1886, p. 481), as very well redescribed by Wilson (1902, p. 401), is a species very like the genotype but characterized perhaps by its very conulose surface. It is yellow with both styles and oxeas. *A. rosacea* of Verrill (1907, p. 341) is probably conspecific with his *A. rudis* described on the same page, although the former was pink and the latter bright red. A difference as to the amount of spicules and foreign material present might account for this kind of a difference in color. The sponge described as *Pandaros walpersii* by Duchassaing and Michelotti (1864, p. 90) is probably an *Axinella* and might receive the above-mentioned *reticulata* into synonymy. *Axinosia* Hallmann is very like *Axinella* but has strongyles instead of oxeas, and in fact has very few spicules other than the strongyles. Its genotype should be understood as being *Axinella symbiotica* Whitelegge (1907, p. 508).

Dragmacidon Hallmann may be distinguished only with very great difficulty from *Axinella* and also may be compared to *Thrinacophora,* which see below. *Dragmaxia* Hallmann, upon further study, may possibly be dropped into synonymy to *Stylissa* of Hallmann, although it is lamellate where the latter is cup-shaped. It should receive into synonymy *Halichondria hirsuta* Fleming (1828, p. 522) and *Acanthella corrugata* George and Wilson (1919, p. 161). *Homaxinella* Topsent is very like *Axinella,* except that it has only styles. It may therefore be compared to *Stylissa,* to which latter it may just possibly fall in synonymy. A good basis for separation, however, may be the ramose form of *Homaxinella* as compared to the cup-like shape of *Stylissa. Ketosus* new genus is hereby proposed to have as genotype *Dictyocylindrus setosus* Bowerbank (1873, p. 325), a peculiar fan-shaped sponge with strongyles for coring or axial spicules and oxeas as peripheral plumose and dermal spicules.

Pararhaphoxya Burton has all the spicules much curved, the axials are both styles, strongyles, and oxeas; the extra-axial spicules chiefly oxeas. *Phacanthina* Vosmaer is an extremely plumose genus, all the spicules being axial in placement and stylote in nature. *Phakellia* Bowerbank is a well-marked genus with axial strongyles and extra-axial styles at right angles to the former; its genotype should be taken as *Spongia ventilabra* Linné (1767, p. 1296), as redescribed by Bowerbank (1862, p. 1108). This species is recorded by Topsent in 1891 as occurring in the West Indies. Other West Indian species of this genus include *folium* Schmidt (1870, p. 62), which is unrecognizably described, and *lobata* Wilson (1902, p. 399), which is well described. *Phakettia* new genus is hereby proposed for ten species often referred to the genus *Phakellia* but differing from it in having exclusively styles as spicules.

The genotype is hereby established as *Phakellia cactoides* Burton (1928, p. 127). Others to be transferred here are as follows: *beringensis* Hentschel (1929, p. 975), *bowerbankii* Vosmaer (1885, p. 24), *conulosa* Dendy (1921, p. 116), *crassa* Carter (1885, p. 363), *dalli* Lambe (1894, p. 125), *fusca* Thiele (1898, p. 51), *papyracea* Ridley and Dendy (1886, p. 478), *ridleyi* Dendy (1887, p. 159), *tumida* Dendy (1897, p. 236). Of the above, *papyracea* was preoccupied by Carter (1886, p. 379) and therefore a new species name is needed, for which I propose *wellsi*, in respect to Dr. Nelson A. Wells of the U. S. Bureau of Fisheries. The genus *Phycopsis* Carter is very like *Axinella*, except that it seems to have only oxeas; its genotype should be taken as *P. hirsuta* Carter (1883, p. 319) and it should receive into synonymy *Axinyssa aculeata* Wilson (1925, p. 445). *Plicatellopsis* Burton would appear very close to *Homaxinella*, and it is greatly to be desired that a critical comparison should be made of the two genera. I do not think that they are congeneric, but do not have adequate material for the comparison above referred to. *Pseudaxinella* Schmidt is very like *Axinella*, but has no distinctively specialized central axis. *Pseudaxinyssa* Burton is very like *Phycopsis*; as with regard to *Plicatellopsis* mentioned above, the two are probably not congeneric, but we do not have adequate data to point out differences between them that may be readily recognized. *Pseudotrachya* Hallmann has a spiculation chiefly of styles, and is exceedingly hispid. There is a bark-like dermal structure incorporated, however, which is made of oxeas.

Siphonocalypta Burton should be distinguished chiefly for its very symmetrical hollow cylindrical form; it has styles only. *Spongosorites* Topsent has oxeas only and is difficult to differentiate from *Phycopsis*. *S. placenta* Topsent (1896, p. 117), the type of that genus, is a hard, strongly corticate sponge, concerning which there is some possibility that it may be epipolasid. Several species now assigned to *Spongosorites* seem definitely to be epipolasid and are transferred hereinafter to the family Sollasellidæ. The lamellate form and plumose structure of *Spongosorites* proper would seem to indicate relationship to the Axinellidæ. *Stylissa* Hallmann has been described above. A West Indian species originally described as *Amorphina hirta* by Topsent (1889, p. 40) should be transferred to this genus. *Thieleia* Burton is very close to *Homaxinella*, with which it is probably not congeneric, but from which it is exceedingly difficult to differentiate on paper. *Tragosia* Gray seems to differ from *Axinella* only in being cup-shaped instead of ramose. A new genus *Waltherarndtia* is hereby proposed for another type of sponge characterized by very distinctive and graceful external shape and (incidentally) by a beautiful coloration of red and blue. The spiculation comprises only styles, which are arranged in an axial reticulation with dermal tufts. The genotype and only species is that described as *Hymeniacidon caliculatum* by Kirkpatrick (1903, p. 241). The generic name is given in respect to the eminent zoologist, Professor Doctor Walther Arndt of the University of Berlin.

The genus *Bubaris* Gray is very difficult to allocate. It has a spiculation of styles erect upon the substratum, among which are much-curved strongyles. It should receive as a new transfer *Microciona simplicima* Bowerbank (1874). It is quite likely but not certainly to be regarded as Axinellid. Hentschel (1923, p. 407), however, gave it a family of its own and referred the genus *Plocamia* and related sponges to it. Perhaps we should treat it as a subfamily to be called Bubarisinæ or Bubarinæ. It seems to have as a near relative *Ceratopsion* Strand (which lacks the flexuous strongyles) and the unrecognizable genus *Ophiraphidites* of Carter (1876). I would further put in its immediate vicinity *Uplexoa* new genus here established to have as genotype *Bubaris oxeata* Dendy (1924, p. 349) and as its second species *B. elegans* Dendy (1924, p. 350). This is like *Bubaris* except that the auxiliary spicules are oxeas instead of strongyles and are not so greatly bent. Another genus that is exceedingly difficult to place systematically is *Thrinacophora* Ridley; it is very much like *Axinella* in some respects, but it has peculiar spicules with many branches at their ends, in which respect it should be compared to *Oxeostilon* Ferrer Hernández, which is, however, Hymeniacidonid. The genotype of *Thrinacophora* should be taken as *T. funiformis* Ridley and Dendy (1886, p. 484). There is a well-described species of this genus from the West Indian region, namely, *T. spinosa* Wilson (1902, p. 400). The family placement of *Uritaia* Burton is similarly very difficult. It has smaller dermal styles over an endosomal spiculation of longer ones. With much hesitation it is left here temporarily in the Axinellidæ.

Other generic names that need to be considered in this connection include the following: *Astrospongia* Gray is a synonym of *Axinella*; furthermore the name was preoccupied. *Axidragma* Hallmann is a synonym of *Tragosia. Ceratopsis* Thiele is a synonym of *Ceratopsion*, which is a new name erected for it because the original was preoccupied. *Chalinissa* Lendenfeld is a synonym of *Axinella. Plicatella* Schmidt, a name which was preoccupied, is a synonym of *Ptilocaulis*; the genotype of *Plicatella* needs to be understood as being *Reniera labyrinthica* Schmidt (1864, p. 39).

HIGGINSIINÆ new subfamily

This is here established for genera otherwise very like typical Axinellidæ but separated by possession of microscleres which are frequently spiny. It will be noticed that there is in this connection a close approach to the family Spongillidæ of the Haplosclerina and to the Rhaphidistinæ of the Epipolasida. Those genera which have only smooth microscleres may also be compared very closely to the family Adociidæ of the Pœcilosclerina. From the Spongillidæ the chief point of difference is in the method of reproduction and also in the emphasis here of hispid dermal structures. From the Rhaphidistiinæ the difference is in the lack of pronounced radiate structure. From the Adociidæ one may distinguish the Higginsiinæ by lack of the reticulate structure characteristic of the Pœcilosclerina.

This subfamily is not represented at the Dry Tortugas.

Scope of the Subfamily

Among the genera with more or less spiny microscleres to be referred to the subfamily Higginsiinæ occur the following: *Dendropsis* Ridley and Dendy has a reticulation of styles and as microscleres has spiny oxeas. *Desmoxya* Hallmann has as megascleres styles, oxeas and also strongyles. Among the microscleres are small smooth rhaphides and other much larger ones, and yet a third sort that are spined at the termination only. *Higginsia* Higgin is like *Dendropsis*, but has oxeas in addition to styles as megascleres. *Negombo* Dendy has its principal spicules styles; the spined microscleres have the spines more or less in whorls, somewhat like the discorhabds of *Podospongia*, but the architecture is very different.

Examples of this subfamily in which the microscleres are not spined but smooth include the following: *Calyx* Vosmaer is a cup-shaped sponge with peculiar bristly fibers. *Hemigellius* Burton is a genus in which the megascleres are oxeas and the microscleres sigmoid. *Ommatosa* new genus is here proposed to have as genotype *Axinella rugosa* Schmidt (1870, p. 61). This West Indian species has for its principal spicules oxeas and strongyles, the latter being arranged chiefly in an axial concentration; the microscleres are possibly to be interpreted as sigmoid, although not typical, being merely somewhat curved rhaphides. The external form is very peculiar. It is typically tuberculate, with conspicuous spicular projections. *Vagocia* new genus is here established to have as genotype *Gellius arcuarius* Topsent (1913, p. 638). Other species which should be transferred into this new genus include *Gellius imperalis* Dendy (1924, p. 322) and *Gelliodes kerguelensis* Hentschel (1914, p. 127). The megascleres are merely oxeas. The microscleres are small rhaphides which are sometimes so bent as to simulate toxas. It is not certain that they are typical toxas. The genotype is a thin fan, the general structure is not an isodictyal reticulation in general, although such is suggested, but instead comprises conspicuous bristly tracts as in *Calyx*.

Other generic designations which need reference here include *Lieberkühnia* of Balsamo Crivelli, which is a synonym of *Calyx*, and *Diacarnus* Burton, which is a synonym of *Negombo*.

HALICHONDRIIDÆ Gray

This family is characterized by exceedingly simple spiculation, frequently of only oxeas and always of only smooth megascleres without any microscleres. In this respect it is very much like the family Haliclonidæ of the order Haplosclerina. It is also very much like the genus *Adocia* of the Pœcilosclerina. Individual specimens are very frequently difficult to allocate as between genera in these groups. The Halichondriidæ, however, are characterized by having special dermal skeletons, although these are not always conspicuous. Such special ectosomes are completely lacking in the Haplosclerina. Furthermore, the *Halichondrina* seldom if ever have the conspicuously isodictyal reticulation of the contrasting groups. A significant summary of this discussion may be to point out that the simplest genera in each of these three orders are very much alike.

HALICHONDRIA Fleming

This genus is thoroughly typical of the family. Its spicules are only oxeas. These are of tremendous variation in size, with the different sorts scattered indiscriminately throughout the sponge. There is a definite dermal skeleton of tangentially placed spicules over very extensive subdermal spaces. The endosome represents the extreme of the condition known as "crumb of bread." There are some spicular tracts, but more spicules in confusion. Johnston (1842, p. 122) described a species of *Halichondria* under the species name of *incrustans*. Kieschnick (1896, p. 530) used the same name again for a different sponge. This name being preoccupied a new one is required, and I propose for it *brøndstedi*. Brøndsted (1924, p. 117) has used the name again for what appears to be a third species. Lieberkühn in 1859 used the name *Halichondria reticulata*. Bowerbank in 1866 used the name *Hymeniacidon reticulata* for a species which Topsent in 1894 transferred into *Halichondria*. The name being preoccupied there, and a new name being required, I propose for this the species name *topsenti*. Baer in 1905 (p. 12) described a different species as *Halichondria reticulata*. The name having been twice preoccupied, I propose for this species the name *baeri*. Brøndsted (1924, p. 450) has used the name a fourth time for his *Halichondria reticulata* from New Zealand.

Halichondria melanadocia new species

This species is moderately common in the moat of Fort Jefferson. I collected the holotype, U. S. Nat. Mus. Cat. No. 22463, on June 28, 1932, in the moat.

The range of shape is from encrusting to massive, chiefly amorphous, with oscules raised high above the mass. The color of the ectosome is nearly black both in life and in alcohol, but the endosome is drab. There may be a noticeable fetid odor when the sponge is freshly collected. The consistency is very soft, easily torn and very compressible. The pores are about 60μ in diameter and well scattered over the surface. The oscules are very irregular, often about 3 mm. in diameter. They may be raised on processes as much as 1 or 2 cm. high and less than half that wide. A smooth dermis some 40μ thick overlies very extensive subdermal cavities about 110μ in height, so that the dermis is easily detachable. It contains very numerous spicules tangentially arranged. The endosome is optically like "crumb or bread," and microscopically seems to have spicules arranged chiefly in confusion in the sheets of soft tissue which surround the chambers. There are, however, tracts of spicules in six or eight parallel rows, the total diameter of the tract is 20 to 40μ. The spicules are of one sort only, those of the ectosome seemingly quite like those of the interior, not distinctly smaller nor larger. All are oxeas varying from at least as large as 9 by 472μ, often 7 by 432μ, but also very often as small as 5 by 132μ. This great variation in spicule size is typical of the genus.

Amorphina nigrocutis Carter (1886, p. 50) was described from the south of Australia, and transferred to *Halichondria* by Dendy in 1894 (p. 239) with much hesitation. It may be epipolasid. On the other hand, its description tallies in considerable detail with *melanodocia* with the exception of minute details as to the pores (they are very abundant in *nigrocutis*), in the proportionate sizes of spicules, and the one really significant point, that in *nigrocutis* the estosomal spicules are (per Dendy, *loc. cit.*) much smaller than those of the endosome. So exceedingly many species have already been described in the genus *Halichondria* that it is with real regret that I conclude it is unsafe to identify this with Carter's Australian species.

Scope of the Family

In the family Halichondriidæ we find three groups of sponges having this in common, that the subdermal cavities are so very enormous that the dermis is merely a roof supported on slender columns far above the floor (the endosome). The first of these is *Apatospongia* Marshall, of which the entire spiculation appears to be oxeas. It would seem that *Oceanapia imperfecta* Dendy (1895, p. 249) should be transferred to this genus. In contrast to this is the some ways similar genus *Ciocalypta* Bowerbank, which differs in having styles instead of oxeas. There is some confusion as to the proper name for the type of this genus, which has been taken as *Ciocalypta penicillus* Bowerbank (1862, p. 1105); this can not be used as the species name, however, because Topsent (1930, p. 13) proves that it is conspecific with *Spongia cavernosa* of Lamarck (1814, p. 371), but not with *S. cavernosa* of Pallas (1766, p. 394), which has priority, and therefore a new name is needed. I propose the species name *alleni* for *Spongia cavernosa* of Lamarck which becomes *Ciocalypta alleni.* This species name is given in respect to the eminent scientist, Dr. E. J. Allen, Director of the Marine Biological Association, Plymouth. I also propose the name *Ciocalapata* new genus for sponges unlike either of the other two in that they contain both oxeas and styles, but have similar architecture. The genotype is designated as *Ciocalypta amorphosa* Ridley and Dendy (1886, p. 479). *Amorphinopsis kempi* Kumar (1925, p. 226) should be transferred into this genus and also the following three species originally described as in the genus *Ciocalypta: dichotoma* Dendy (1915, p. 118), *sacciformis* Thiele (1900, p. 76) and *weltneri* Arnesen (1920, p. 24).

Other genera here referred to the family Halichondriidæ include the following: *Dactylella* Thiele has oxeas making a special axial skeleton. *D. rhaphoxea* de Laubenfels (1934, p. 12) is West Indian. *Halichondriella* Burton is characterized by having tangential dermal diacts. *Leucophloeus* Carter, genotype *L. massalis* Carter (1883, p. 323), resembles *Ciocalypta,* but has much more compact structure. *L. incrustans* Ferrer Hernández (1912, p. 17) requires a new name because this was preoccupied by Thiele (1898, p. 48). *Trachyopsilla* Burton also has peculiar arrangement of the oxeas which make up practically its entire spiculation. *Trachyopsis* of Dendy is rather closer than the above to *Halichondria,* but may be differentiated on the basis of fine distinctions in the arrangement of spicules.

Generic designations which belong in the family but represent names to be dropped into synonymy include the following: *Cœlocalypta* Topsent should be dropped into synonymy to *Apataspongia. Halispongia* Blainville is a synonym of *Halichondria. Pellinella* Thiele is a synonym of *Halichondria. Spuma* Miklucho Maclay is chiefly unidentifiable, but probably is also a synonym of *Halichondria.*

SEMISUBERITIDÆ new family

This designation is proposed for a group of genera of which the typical one is *Semisuberites.* The name, however, is misleading, for the relationship to *Suberites* is apparently not very great. On the other hand, that there should be a confusion indicated in the name is quite appropriate, because this group is very difficult to place systematically. The spiculation consists of megascleres that are indiscriminately oxeas, styles and strongyles in a vaguely plumose arrangement; much like that in the family Axinellidæ. The plumose plan is broken by frequent pronouncedly reticular structures, however, and to this extent the resemblance is to the order Pœcilosclerina, somewhat like Ophlitaspongiidæ with diacts among the principal spicules. Because some tendency to reticulation is shown by the genus *Halichondria* itself, and because of the additional resemblance to *Axinella,* it seems most fitting to leave this family in the Halichondrina. It is represented by at least one species from near the Dry Tortugas.

RHAPHISIA Topsent

This genus has as megascleres only oxeas, and as microscleres it has only microxeas. It is soft and fleshy, with its spicules in confusion. It is interesting to compare this to the genus *Tedanione* Wilson of the Desmacidonidæ; if there were a few tylotes added the comparison would be very close. *Tedanione* is not sufficiently fibrous to be really typical of the Desmacidonidæ and might possibly be transferred to the Semisuberitidæ. The genus most like *Rhaphisa,* however, is *Rhaphoxya,* to be discussed later.

Rhaphisia ambrosia new species

One specimen, the holotype, U. S. Nat. Mus. Cat. No. 22452, was encrusting a rock dredged from 70 meters dept on June 26, 1932, southeast of Loggerhead Key.

The encrustation is from 2 to 4 mm. thick. It was rich ochre yellow in life, with both the color and general appearance of honey, and a rather corky consistency. No oscules nor pores are visible to the naked eye. The surface is just barely lumpy, except that there are a very few spicules projecting irregularly, as shown by microscopic study. With the lens one finds surface openings 100 to 200µ in diameter, but not sharply differentiated by size into oscules and pores. There is minimum of dermal specialization, and that is fleshy, containing some spicules tangentially strewn. The interior is so very thin that the details are not readily made out as to the architecture.

There may be a vague reticulation of tracts, but this is not plainly in evidence, the principal impression being of confusion. The spicules are almost all oxeas; an occasional style may be regarded as merely a malformation. The size range is very great, the larger ones being 20 by 810μ, or even longer, and the smaller 3 by 540μ. There are fairly numerous intermediates but rather more of the two sizes mentioned than of any others.

This specimen is admittedly rather difficult to allocate. On paper, at least, it sounds a great deal as though it might be a *Halichondria*. It does not, however, give the appearance of *Halichondria* in comparison to slides and specimens of undoubted members of that genus, particularly in respect to the ectosome. Quite a few spicules are even smaller than the smaller size range mentioned above. These may be juvenile forms or might possibly be interpreted as microscleres. This leads one to compare the species very closely with that first described as *Thrinacophora spissa* by Topsent (1892, p. 124), and in 1894 (p. 5) referred by him to *Rhaphisia*. This species (from the Azores) bears a great deal of resemblance to *ambrosia*. So far from regarding this Dry Tortugas specimen as *Halichondria*, it is with considerable doubt that I separate it from the above-mentioned *spissa*. The surface structure of that, however, was rugose, the number of the smaller spicules considerably larger, and a fair amount of foreign material was included as the sponge grew. None of these are very material points of difference, and the two species must be regarded as closely related.

Scope of the Family

Among the other genera that may be referred to this family are the following: *Cladocroce* Topsent has axinellid fibers in a background that is isodyctial or even to be described as renierid. The spicules also consist exclusively of oxeas. *Dragmatella* Hallmann is something like *Rhaphisia* with the larger oxeas replaced by styles, the smaller spicules still being oxeas. The structure is rather cavernous and the dermal structures are tangent. *Pachaxinella* Burton is a ramose sponge with an axial reticulation, all the spicules being styles. *Rhaphoxya* Hallmann has principal spicules that vary from oxeas to styles and strongyles that are considerably curved. The smaller spicules seem all to be oxeas; the structure is papillate and subreticulate. *Semisuberites* Carter has only styles, is subreticulate, and is cup-shaped in general form. *Stylaxia* Topsent, according to Burton (1932, p. 196, Science Reports Tohoku Imp. Univ. 4 Ser. vol. 7, No. 2), is a synonym of the above.

HYMENIACIDONIDÆ de Laubenfels

This group is separated from the Ciocalyptidæ of Hentschel and the Axinelliidæ of other authors for those genera characterized by having a fleshy ectosome not profusedly echinated (or hispidated) by erect spicules. The endosomal structure throughout is very much indeed like that of *Axinella*, varying from plumose to confused, and is often more or less gelatinous in consistency. The dermis is always very skin-like, containing few if any spicules, and those usually tangentially placed. In this latter respect there is a very great deal of resemblance to the Desmacidonidæ of the Haplosclerina, which family differs in having a more reticulate type of architecture and in that many of its genera have elaborate microscleres. The latter are practically or entirely wanting in the Hymeniacidonidæ. As in Axinelliidæ the megascleres are smooth oxeas, styles, or strongyles, or combinations of these. Probably the closest relationship of all is to the Halichondriidæ, which are sponges much less fleshy than those referred here. The family is well represented in the West Indies.

HYMENIACIDON Bowerbank

This genus is very typical of the family in general, but has as its megascleres exclusively styles. These in general are strewn in considerable confusion throughout the flesh. The genus is well represented throughout the world, and there are two species from the Dry Tortugas, to be described below. With considerable hesitation I would transfer to this genus the sponge described as *Rhaphidophlus pauci-spiculus* by Burton (1932, p. 320). There may be a good reason for excluding it from the genus *Hymeniacidon*, but to judge superficially from the description it would seem to belong here. Other species that should by all means be transferred into this genus are as follows: *Stylotella aplysilloides* Lendenfeld (1888, p. 187), *S. conulosa* Topsent (1897, p. 466), *Chalina inornata* Bowerbank (1874, p. 277), *Isodictya invalida* Bowerbank (1874, p. 289), *Stylotella gorbunovi* Rezvoy (1932, p. 510), *Isodictya pertenuis* Bowerbank (1882, p. 144), *Stylotella timonovi* Rezvoy (1932, p. 512), *S. topsenti* Arnesen (1920, p. 18).

Hymeniacidon amphilecta new species

The holotype, U. S. Nat. Mus. Cat. No. 22506, was trolled July 22, 1932, southeast of Garden Key, at a depth of about 25 meters.

It is an irregular mass about 3 cm. thick and 7 cm. in diameter. The color in life was a rich brown, which looked like a mixture of green and red; indeed tinges of both colors could be seen. The specimen when placed in alcohol rendered that fluid a decided green in color and by the process was left itself somewhat purplish red. Perhaps the green was chlorophyll. The interior at a depth of 1 mm. or more from the surface is very much paler than the ectosome. The consistency is firm, somewhat compressible, but hardly to be described as spongy. The surface is smooth. The oscules are 1 to 4 cm. apart and 2 to 3 mm. in diameter. They show plain indications of being susceptible to closure, presumably by sphincters; some as preserved are in this way more than half closed. The pores are 80 to 270μ in diameter. The dermis is not readily separable from the structure below; it is fleshy and perhaps 20 to 50μ thick, but is inextricably enmeshed with the outermost portion of the principal skeleton. The outer endosome is of the sort that may be described as "crumb of bread" with fleshy material surrounding sub-spherical chambers of great variation in size. Throughout the flesh run vague somewhat plumose ascending tracts some 19μ in diameter, made up of about sixteen or more spicules in cross-section. Even more numerous are vague meandering secondary tracts 20 to 40μ in diameter, which anastomose and branch so irregularly that it seems not worth while to estimate any mesh size for them. The secondary tracts contain three or four rows of spicules only. In addition there is a very large number of spicules loose in the flesh, not at all in the tracts. The spicules are smooth styles, often much curved, 3 by 330μ to 6 by 340μ; the larger size is predominant. There is no localization of spicule categories evident. The ectosome, for example, contains spicules very much like those of the endosome, in as great or greater confusion of arrangement.

It seems feasible to compare this species most closely to one from California described by de Laubenfels in 1932 (p. 60) as *Hymeniacidon ungodon*. Both have the peculiar combination of darker brown ectosome over paler endosome, which is quite uncommon in this group. *Ungodon's* spicules are thicker and shorter, being 4 by 180μ to 8 by 200μ in size. Ideally complete comparison within this genus needs to await considerable revision of the species that have been and should be referred to it.

Hymeniacidon heliophila [Parker] de Laubenfels

This specimen was dredged August 6, 1932, from a depth of 25 meters, east of Garden Key.

It is a crust 1 to 2 mm. thick on a *Verongia* and was orange in color in life. The consistency is softly spongy, fairly tough. The surface is conulose, the conules being about 200µ high, 1 mm. apart. Pores and oscules are not evident, apparently because they have closed. The structure is fleshy, with little cavity and small canals. The spicules are partly in confusion, but here and there in vague ascending tracts, the spicules often placed so that the points are toward the surface. The diameter of the tracts is a little over 100µ. The spicules are very gradually tapering, straight, smooth styles of extreme variation in size. Some are as large as 6 by 490µ, others as small as 3 by 212µ only.

This species was first described as *Stylotella heliophila* by Parker (1910, p. 767), in connection with his discussion of the elementary nervous system. Later Wilson (1911, p. 13) redescribed it, again in the genus *Stylotella*. In 1932 (p. 60) de Laubenfels referred it to *Hymeniacidon* with a discussion of the close relationship between this form and various European members of the genus.

Scope of the Family

There are about a dozen other genera that need to be referred to the family Hymeniacidoniidæ: *Acanthella* Schmidt needs to have its genotype established as being *A. acuta* Schmidt (1862, p. 64). This genus has straight styles and long, much curved strongyles, resembling somewhat those in the genus *Bubaris*. The structure, however, is very different; the sponge is conulose, fleshy, with axial specialization, and with tracts that diverge from the same. *Adreissa* Topsent has only styles, the interstitial ones being smaller than those in the tracts. The sponge is collenchymatous and papillate. *Batzella* Topsent is another soft, smooth sponge with spicules varying from styles to oxeas to strongyles. It is especially noteworthy for peculiar embryos. *Collocalypta* Dendy is a plumose sponge having only oxeas as spicules. It is conulose and there are spongin fibers and large quantities of a jelly-like substance present. *Densa* de Laubenfels is exceedingly like *Hymeniacidon* except that it has only oxeas and not (instead) styles. Its one species, *D. araminta* de Laubenfels (1934, p. 14), is West Indian. *Ectyobatzella* Burton and Rao has only monactines; these are more or less malformed styles. It also is conulose, with a conspicuous dermis resembling fleshy skin. *Hoplochalina* Lendenfeld has dendritic fibers of spongin which are cored with oxeas only, and has a considerable resemblance to a keratose sponge in its external appearance. It will be noticed that this genus approaches close to the family Desmacidonidæ of the Haplosclerina and is rather difficult to allocate. The dendritic nature of the fibers in contrast to the reticulation of Desmacidonidæ influences the decision to leave it in Hymeniacidonidæ. *Oxeostilon* Ferrer Hernández has the surface structure that is characteristic of the family in general, and has two types of megascleres—one a style and the other an oxea. It would seem advisable to transfer to this Genus *Halichondria heterorrhaphis* of Breitfuss (1912, p. 64). *O. burtoni* de Laubenfels (1934, p. 15) is West Indian. *Prianos* Gray is a typical member of the family Hymeniacidonidæ, having only strongyles as spicules. *Rhapidostyla* Burton has been very recently established, and I do not yet have adequate data for its proper allocation, in particular have not yet seen the description of its genotype, *R. kitchingi* Burton (1935, p. 651). Burton transfers here three species that by their published descriptions appear to be typical

Hymeniacidon. Perhaps these first descriptions are incorrect. The three are *Stylotella marsillii* Topsent (1893, p. XLI) *Phakellia incisa* Schmidt (1880, p. 282) and *P. plicata* Schmidt (1880, p. 282). *Viles* de Laubenfels is a genus erected for sponges much like *Acanthella* but having oxeas for main spicules instead of styles; these oxeas are very flexuous as in the illustration of the unrecognizable genus *Ophiraphidites* Carter. The one species is *V. ophiraphidites* de Laubenfels (1934, p. 13) and is West Indian.

There are various other genera that need consideration in this connection such as the following: *Dictyonella* Schmidt, of which the genotype needs to be established as *D. cactus* Schmidt (1868, p. 10), would seem to belong in the Hymeniacidonidæ from what we know of it, but the amount of information available is inadequate for satisfactory placement. *Acanthellina* Carter, of which the genotype needs to be established as *A. rugolineata* Carter (1885, p. 365), is a synonym of *Acanthella. Amorphilla* Thiele is a synonym of *Hymeniacidon. Stylohalina* Burton is a synonym of *Hymeniacidon.* A genus which is very difficult to allocate on the basis of published description is *Hemimycale* Burton. Its type is *Desmacidon columella* Bowerbank (1874, p. 243). This species by description would be a typical *Prianos,* but Burton in 1934 (p. 556) states that he has re-examined the original specimen of Bowerbank, and that instead of having altogether strongyles, those spicules were actually rare and the principal ones were tylote. In view of this redescription of Burton, it is evident that the species which I examined on the coast of Great Britain in 1928 and which is referred to in de Laubenfels (1932, p. 62) was not *columella* but instead was a British occurrence of Schmidt's Mediterranean species which he (1864, p. 38) first called *Reniera amorpha,* which same is the type of *Prianos.* Perhaps Bowerbank had studied and described a specimen of *amorpha,* described it as *columella,* but then labeled and preserved instead the specimen which has required the establishment of the genus *Hemimycale.*

MONANTHIDÆ new family

This family is established for genera which give more or less satisfactory indication that they are closely related to the Axinellidæ or similar families, but which are set apart by the possession of the modified spicules known as desmas. There are three lithistid genera included here. *Monanthus* Kirkpatrick has a spiculation of oxeas (and rarely styles) arranged in plumose fashion, in addition to monocrepid desmas. *Petromica* Topsent has chiefly peculiar styles in the dermis, oxeas in the main skeleton, together with monocrepid desmas. *Stylinos* Topsent has only styles as spicules in addition to greater or smaller quantities of desmas. *Crambe* Vosmaer and *Tetranthella* Lendenfeld fall in synonymy to *Stylinos.*

HADROMERINA Topsent

This order, called Astromonaxonellida by Dendy and by Hentschel, is characterized chiefly by a megasclere spiculation of tylostyles. Spicules of this sort are found also rather commonly here and there in the family Ophlitaspongiidæ of the order Pœcilosclerina, and in occasional genera of other families of that order, especially as auxiliary or dermal spicules. The heads, however, in those cases are seldom of very much greater diameter than that of the shaft, whereas in the order Hadromerina the tylostyle is the chief spicule and frequently the head is very much larger than the shaft. This latter order is also characterized by the possession in very many of its genera of radiate, or subradiate, architecture, often with a pronounced cortical specialization in the ectosome. Both of these latter features are exceedingly characteristic of the tetraxon sponges referred to here as the orders Choristida and Carnosa, and to some extent also by the order here termed Epipolasida. These three, and the Hadromerina, are also notable among the Demospongiæ for the total, or almost total, lack of spongin. The Hadromerina, however, differ markedly from the other three orders that have radiate structure, corticate ectosome, and no spongin, by the possession of the tylostyles. That they may be more closely related to the Pœcilosclerina than to the others is indicated by the fact that they sometimes do have spongin as in that order, and that (as mentioned above), genera in that order do sometimes have tylostyles.

The order Hadromerina is here separated into families largely upon the basis of the presence or absence and nature of the microscleres. This is here adopted as a policy because it has been long in effect, the orders employed having been established in many cases for several decades. It is fully and freely admitted, on the other hand, that this is a rather slender basis for separation of families. It will be noted that in the order Pœcilosclerina, as above outlined, many of the families have within them tremendous differences as to the presence or absence of microscleres, and as to the type of microscleres when those are present. It might therefore be well argued that the entire order Hadromerina was equivalent merely to a single family of the complexity of the families such as Desmacidonidæ and those of the Pœcilosclerina.

CHOANITIDÆ new family

This name is here used for Spirastrellidæ of Hentschel because the genus *Choanites* is thoroughly typical of the group and is much older than the genus *Spirastrella.* The architecture is typically radiate, the body compact, the surface armoured by densely packed masses of spicules usually perpendicular to it. Spongin is only rather dubiously present, and the isodictyal type of reticulation, in which spicules are fastened together end to end, is decidedly lacking. In this family, as characteristic of the order, the megascleres are practically altogether conspicuous tylostyles. There are microscleres present, and these in typical genera of the family Choanitidæ are spined; in fact sometimes so profusely spined as to be asters. A subfamily (Timeinæ), however, is employed for those possessing euasters as compared to the streptasters which occur in the genus *Choanites.* We will first consider the Choanitinæ.

The entire family is well represented in the West Indies.

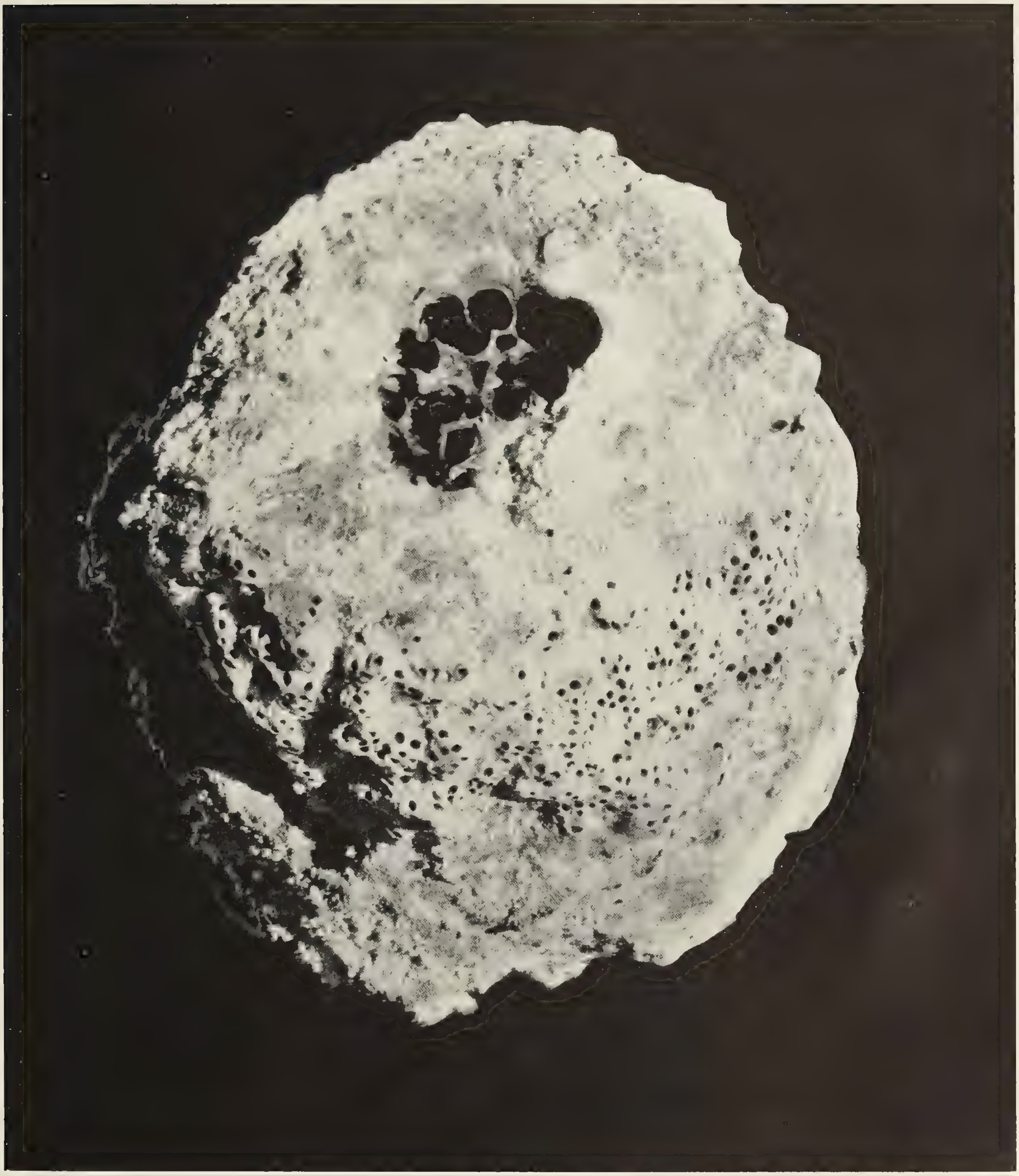
SPHECIOSPONGIA Marshall

The megascleres are tylostyles, usually not localized as to size categories in different parts of the sponge. The microscleres are spirasters, often very rare and difficult to locate. The outstanding characteristic of the genus is the peculiar structure of the inhalent apertures, which are very large and protected by sieves. The external shape is usually symmetrical. The genus is also characterized by enormous size, apparently growing rapidly and enjoying long life. The genotype and almost the only species is the West Indian form to be described below.

Spheciospongia vesparia (Lamarck) Marshall

Plate 16, fig. 1.

This species is very conspicuous in the vicinity of the Dry Tortugas. The number of individuals is fairly large, and they are so enormous as to make considerable bulk. The dredge sometimes comes up so full of these so-called "Loggerheads" that



Spheciospongia vesparia, a rather small specimen, approximately life size, photographed after removal from water. The appearance under water, in life, is very similar in the case of this particular species, because of its rigidity. Note the dark group of oscules on upper surface and clusters of holes, each cluster a sieve, on the lateral surface.

it can not be lifted from the water and must be dumped with total loss of its contents. This species occurs in water so shallow that the top of the sponge is almost exposed at low tide, and from that down to a depth of at least 10 meters.

This species is almost always cake-shaped, so that as seen from above it is nearly perfectly round. The top is almost always a little concave, and sometimes decidedly so, apparently because detritus has accumulated, preventing growth in the middle, while the edges are free to increase in height. The base of the sponge is usually a little narrower than the top. Most of the specimens one notices are well over 30 cm. in diameter, very small specimens being exceedingly rare and found only after careful search. The smallest specimen I was able to locate in the Dry Tortugas region was already 8 cm. in diameter and 6 cm. high. The greatest size I found in the Tortugas region was 94 cm. diameter. There is reliable record at the British Museum of a gigantic fragment of a sponge of this species that was collected and deposited there, the original of which must have been more than twice this diameter, that is to say, well over 2 meters across. Unfortunately, at the time of my visit to the British Museum, the specimen in question could not be located, but that it existed is easily believed, because the sponge fishermen of the West Indian region are most emphatic in describing their experiences with enormous specimens of this, which they call the "Loggerhead" sponge. It is easily the largest known representative of the phylum. The color in life is nearly always black on the outside and drab inside. The ectosome may or may not show some indications of purple or of brown. The interior may or may not show more or less tinges of yellow. In alcohol a lavender tint is quite noticeable; when dried the color is chestnut brown. The consistency is about that of soft wood. Its surface is smooth, or with very low lumps. There are often pits on the upper surface, caused by fragments of foreign material lodging there, with subsequent greater growth of the surrounding tissue. With sponges suffering such deformation, the causes of which are usually removed before deposition in museums, there is possibility for misinterpretation of the natural growth tendency, or proper external shape of the species, on the part of those who study only museum specimens. On only the upper surface of this species there are often numerous evident oscules, up to nearly 1 cm. in diameter, which may be closed within a matter of only a few minutes by muscular sphincters. Their total area is apparently never as great as the area of the pore sieves. On August 6, 1932, at a depth of 25 meters, in the waters east of Garden Key, we collected one specimen of *vesparia*, diameter 30 cm., height 25 cm., with none of these evident oscules on the entire specimen. This is very puzzling, and one may speculate as to the possibility that the structures usually interpreted as pore sieves may in some cases represent exhalent as well as inhalent apertures. The nearly vertical sides of this species are always riddled with numerous openings. The canals, which lead in an almost horizontal direction toward the center of the sponge, are approximately 1 cm. in diameter and covered externally with sieves that resemble plates 2 mm. thick, abundantly perforated with round holes 1 to 2 mm. in diameter, with about ten to twenty such holes per sieve. The canals have a very fleshy, often rather bluish lining, and branch repeatedly, somewhat after the manner of the bronchial tubes of a vertebrate. Here and there on the surface of the sponge, between the above-mentioned so-called pore areas, are apertures up to 120μ diameter, that certainly also resemble pores, but of the more common type. The large canals here described are usually inhabited by shrimps (*Synalpheus brooksi*), but it should be noted that this same species of shrimp also occurs abundantly in other sponges in the vicinity of the Dry Tortugas, representing various families and orders, and that none of these others has at all the remarkable canal structure of *Spheciospongia*.

For this reason one may seriously question that the arthropod is in any way responsible for the architecture of the sponge. Reference should be made to the account by Pearse (1932) of the inhabitants of sponges, especially *Spheciospongia.* The hydraulic efficiency of *Spheciospongia* is apparently very poor. While studying undisturbed sponges (using the diving apparatus) neighboring specimens of *Hircinia* could be seen to eject strong currents of water, by observing the movements of particles suspended in the fluid, whereas at the same time even large specimens of *vesparia* gave absolutely no evidence of any current that could be made out, even by careful study.

The flesh that surrounds the canals is permeated by spicular tracts of great variation in size. Some are as small as 20μ, others as large as 2 mm. in diameter. These occasionally branch or anastomose, but no regular net is formed. At the surface these tracts merge into a region of densely packed spicules. Both in the tracts and in the cortex, the points of the spicules are usually directed toward the surface of the sponge. The dense ectosome above referred to as the cortex is 2 to 5 mm. thick. Overlying it there is also an organic specialization of dark cells making a thin layer of about 40μ thickness. No localization of megascleres according to categories is evident; they are essentially of just one sort. They occur not only in the fibers and cortex, but also strewn loosely in the flesh. All the megascleres are tylostyles, the heads sometimes polytylote, the shafts nearly cylindrical with rather blunt or hastate points. The size is often 9 by 445μ, but a maximum of about 10 by 600μ may be reached. Smaller ones are probably immature. The microscleres are spirasters 12μ, to rarely as much as 15μ, long. The thickness of the spiral shaft varies from 2 to 4μ, the number of bends from one to four, with two or three most common. These spicules seem to be confined to the very outmost layer of the ectosome and to the linings of the canals, and are only moderately common even there.

Lamarck described this species first as *Alcyonium vesparium* (1814, p. 78). In 1930 (p. 26) and again in 1932 (p. 48) de Laubenfels records a somewhat related species from California and lists the synonymy of *vesparia.* The closest relatives of *vesparia* would appear to be in the genera *Cliona, Suberites* and *Poterion,* which indicates how closely related are the genera and families of the entire order Hadromerina.

SPIRASTRELLA Schmidt

This genus has only tylostyles as megascleres and spirasters as microscleres. It differs from the above-mentioned genus (*Spheciospongia*) in the relatively greater number of microscleres present and the lack of any evidence of a tendency to grow up into the cake-shaped enormous form, very many specimens apparently remaining encrusting regardless of all environmental conditions. *Spirastrella papillosa* Ridley and Dendy (1886, p. 491) should be transferred to the genus *Cliona.* Verrill (1907, p. 344) records a *Spirastrella* from the West Indian region under the name of *mollis,* but his description is so brief that one can not be certain as to exact relationships of the form in question. Schmidt (1868, p. 17) described a Mediterranean species as *S. cunctatrix,* the type of the genus, and Topsent (1918, p. 542) identified a West Indian species with *cunctatrix.* I am confident that his species was conspecific with that to be described below, *coccinea,* but not that the West Indian variety is identical with the Mediterranean, and if it is, then *cunctatrix* must fall in synonymy to *coccinea.* The genus is widely distributed throughout the world and all the ascribed species thereof would appear to be very closely related to each other; perhaps all are synonyms of the genotype.

Spirastrella coccinea (Duchassaing and Michelotti) new combination

Plate 19, fig. 1.

Several specimens of this sponge were collected on June 30, 1932, on Bush Key Reef, on the underside of boulders barely submerged at low tide.

Each of these specimens is chiefly a mass of coral sand in lumps over 1 mm. in diameter, held together by minute bits of the flesh of the sponge. The total mass is 2 to 3 mm. thick and the largest covered about 5 sq. cm. The color in life was red-brown, but it has faded in alcohol nearly to white. The consistency is not evident from the specimens, but was probably cork-like. The surface is minutely tuberculate, the rounded protrusions having a diameter of about 200μ. Because of the content of foreign matter in the specimens, it is impossible to measure accurately the thickness of the cortex. It is packed with the spirasters. The endosome contains bunches of the megascleres, points directed toward the surface, sometimes even projecting slightly beyond it. The megascleres are tylostyles, about 6 by 360μ. The microscleres are spirasters, the shaft often as large as 4 by 20μ, less often as small as 2 by 12μ. The size of the spines varies as the size of the shaft, but the number is usually greater on the smaller microscleres and smaller in the larger ones.

As noted above, all the species of *Spirastrella* as described seem to be very closely related to each other and in particular to the genotype. If a distinction is to be made between *coccinea* and the Mediterranean form, it is that the West Indian species has spirasters that are more definitely spiral and more frequently with dull pointed spines than is true of the form from the old world. These are admittedly almost insignificant distinctions. Since *cunctatrix* was not described by Schmidt until 1868 (p. 17) whereas *coccinea* was described (as *Thalysias c.*) by Duchassaing and Michelotti (1864, p. 84), the latter name has clear priority.

SCOPE OF THE SUBFAMILY

Other genera of the subfamily Choanitinæ include the following: *Alcyospongia* de Laubenfels externally resembles *Podospongia,* but its centrum of radiation is basal whereas that of *Podospongia* is very near the middle of the sphere. *Alcyspongia's* megascleres are oxeas, its microscleres straight streptasters, not spined, but sometimes nodal. The one species, *A. india* de Laubenfels (1934, p. 18) is West Indian. *Anthosigmella* Topsent has very peculiar spirasters with the spines located on only the convex side of the curved main shaft. It should receive in synonymy the species described as *Hymeraphia minax* Topsent (1888, p. 141). The genotype is an abundant West Indian species first described by Duchassaing and Michelotti (1864, p. 86) as *Thalysias varians.* Schmidt (1870, p. 46) described it as *Suberites tuberculosis*; Carter (1882, p. 352) described it as *Suberites coronarius,* and Topsent (1889, p. 35) described it as *Papillina arcuata. Cerbaris* Topsent also has peculiar spirasters which are provided with very small spines and are so very much contorted that they resemble springs. *Suberites spinispirulifer* Carter (1879, p. 345) should be transferred into this genus. *Choanites* Marshall has megascleres that are tylostyles and microscleres that are microspined microstrongyles, often centrotylote. This genus has frequently been used for fossil sponges, seldom for others, but Mantell (1822, p. 178) plainly cites as the type of the genus *Alcyonium ficus* of Linné (1767, p. 1295) and Pallas (1766, p. 356). This being also the type of *Ficulina* Gray (1867, p. 523), this much later genus must fall in synonymy to the earlier. Many authors opine that the genus *Suberites* is also a synonym of *Ficulina,* and it will be noted that this also being later than *Choanites* would fall in synonymy were the two really regarded as congeneric. It would appear on the basis of published evidence that another very old species needs to be transferred to this genus, namely *Spongia suberea* of Montagu (1818, p. 100). *Dotonella* Dendy has the usual spiculation of tylostyles as megascleres. In addition to the spirally shaped spirasters, there are others having a straight shaft on which the spines are arranged in a spiral manner. The genus *Gapoda* is here established for a very remarkable sponge described by Lendenfeld (1886, p. 562) as *Raphyrus hixoni*, and well redescribed by Hallmann (1914, p. 298). I have also studied original specimens of it in the British Museum. One specimen at collection weighed over 100 kilograms, or over 200 pounds. The shape is very peculiar, there being a series of successively smaller comparatively thin disks, erected and held apart one above the other, on a central axis or column. The megascleres are tylostyles and there are three sizes and shapes of spirasters for microscleres. *Halicnemia* Bowerbank is very like *Choanites*, except that the centrotylote microscleres are oxeote rather than strongylote. *Cæsarellum* new genus is here proposed for species characterized by centrotylote strongyles as megascleres and spiny microrhabds as microscleres, which may conceivably be closely related to several of the other genera in this family. The one species, the genotype, was described as *Bubaris gallica* by Topsent (1894, p. xxxv). Some little doubt is cast upon the proper family location of this genus by the fact that it gives some indications of relationship to *Myrmekioderma* Ehlers, which has been considered above as belonging to the Phorbasidæ of the Pœcilosclerina. In it the spiny spicules were interpreted as being megascleres rather than microscleres, and none of the spicules, or few of the spicules, were centrotylote. *Laonænia* Hallmann has the principal spicules frequently centrotylote strongyles also, and in addition has polytylote tylostyles. The microscleres or dubious megascleres are oxeas with spines arranged in whorls. The species described in 1880 (p. 468) by Carter as *Hymeraphia eruca* should be transferred to this genus of Hallmann's. *Latrunculia* du Bocage is a genus of rather massive forms as might be expected in this family, but with peculiar raised pore areas. The megascleres of the genotype (*cratera* du Bocage, 1869, p. 161) are only styles, but many species of this genus have tylostyles, or polytylote styles that are probably intermediate between styles and tylostyles. The spiny microrhabds have the very symmetrical shape termed "chessman spicule" or discorhabd. It may be that the location of the forming spicule with respect to the surrounding tissues may be responsible for altering a commonplace streptaster into the discorhabd. Similar spicules are found in the Podospongiidæ and in *Negombo* of the Higginsiinæ; see also *Sigmosceptrella*, below. The sponge described as *Latrunculia natalensis* by Kirkpatrick (1903, p. 237) should be transferred to *Podospongia*. The genus *Nisibaris* is here proposed for a species very close to the genus *Cerbaris* described above, from which it differs in that the main spicules are styles rather than tylostyles, an occurrence very uncommon in this family, and in the equally strange circumstance that the spirasters are monoctinal, that is to say modified styles, rather than diactinal. The type and only species is that described by Burton (1931, p. 352) as *Hallmannia spirophora*. *Rhabderemia* Topsent has a very distinctive spiculation of rhabdostyles, contort tylostyles, and for microscleres has spiny thraustoxeas. Its genotype needs to be established as *R. guernei* Topsent (1890, p. 28). There is a West Indian species belonging in this genus and which should now be transferred to it. It was originally described by Carter as *Microciona pusilla* (1876, p. 239). *Rhabdosigma* Hallmann is a very similar genus, but lacks the rhabdostyles; it has instead the peculiarly twisted styles or tylostyles, and more definitely sigmoid microscleres than those of *Rhabderemia*. Its genotype needs to be understood as being

Sigmaxinella mammillata Whitelegge (1907, p. 512). *Sigmosceptrella* Dendy is very close to *Latrunculia*, but its microscleres pass through a sigmoid stage before, as adult spicules, becoming discorhabds. It may be that the microscleres of *Latrunculia* also represent modified sigmas but merely do not show this so plainly. In all principal items of description other than this sigmoid microsclere stage, *Sigmosceptrella* corresponds to *Latrunculia.*

Other generic names that need consideration in connection with the family Choanitidæ include the following: *Ficulina* Gray is a complete synonym of the earlier *Choanites. Heterocliona* Verrill is a synonym of *Spheciospongia. Laothoë* Gray and *Nænia* Gray are synonyms of *Laonænia,* each having been preoccupied.

TIMEINÆ Topsent

This subfamily is employed for sponges closely related to the Choanitidæ, but differing from typical members of that family in that the asters are not streptasters nor spirasters, but have a one-dimensional axis and are therefore called euasters. This separation is equivalent to that whereby the Stellittinæ are set off as a subfamily in the Ancorinidæ.

The Timeinæ are represented in the vicinity of the Dry Tortugas by two species.

HALICOMETES Topsent

This genus is characterized by having the typical megascleres of the family, to which, however, plain styles are sometimes added. As microscleres there are two sorts of asters, a larger and a smaller, with the smaller frequently having peculiar terminations to the rays. The type of the genus was described originally as *Cometella stellata* by Schmidt (1870, p. 49), and for it Topsent (1898, p. 112) erected the genus *Halicometes,* and later (1920, p. 31) added that in the pedicel there are exotyles. The matter of cylindrical or pedicellate form is, as will be noted, very characteristic of the group. As Topsent also pointed out, the relationship to *Tethya* is obviously very close and one is justified in leaving it in the family Choanitidæ only because all the genera of that family are also closely related to *Tethya.*

Halicometes perastra new species

This specimen, the holotype, U. S. Nat. Mus. Cat. No. 22468, was collected June 28, 1932, from the moat of Fort Jefferson.

It is a cylinder 7 mm. in diameter and 7 cm. high. It was yellow in life and is pale gray as preserved in alcohol. In consistency it is elastic but hard, almost cartilaginous. The surface is much obscured by foreign matter of a hair-like nature, perhaps algæ, probably of several sorts. It was presumably quite hispid as far as the sponge was concerned, as indicated by microscopical study. Neither pores nor oscules are to be found, partly or wholly because of the overlying foreign matter. As for ectosomal specialization, there are very numerous spicules protruding some 150μ from the surface, and extending each on down about the same distance below the surface, making a zone about 200 to 300μ thick that is also characterized by especially dense and dark structure. Throughout the endosome there are numerous fascicular tracts of spicules reaching about 250μ in diameter. These run lengthwise in the cylinder, giving it rigidity. They are supplemented by very numerous spicules placed at right angles to them and radially arranged as seen in transverse sections of the cylinder. In the case of these radially arranged megascleres, the points of the spicules are directed toward the same general direction as the points of the megascleres in the tracts, which direction we may assume was the upper or distal portion of the cylinder; it now is broken at both ends so we can only surmise. All these spicules are remarkably uniform in size and shape, being tylostyles about 9 by 690µ; some are as small as 7 by 540µ, and some are as large as 13 by 1888µ, but both of these extremes are relatively rare. The flesh is also abundantly supplied with tylasters of about twelve rays each, the total diameter of the microsclere being some 12µ. Another sort of stubby armed asters also occurs; those of this kind are only 8µ in total diameter.

The typical species of *Halicometes* have a cylindrical form capped above with a subspherical lobate mass; such may have occurred on this Dry Tortugas specimen and have been broken off, in which case that which we have in the collection would be merely a portion of the stem of the total specimen. There is a slight suggestion of relationship to the family Podospongiidæ in this external form, but, as noted above, in general the genus and species have as their closest relatives members of the genus *Tethya*. The latter, however, is never so pronouncedly stalked, and in it the larger microscleres are spherasters; there are further differences in the megascleres. Because of relationship indicated in the megascleres, close comparison should be made to the genus *Timea*, for which see below.

PARATIMEA Hallmann

This peculiar genus has diactinal spicules in addition to the typical megascleres or tylostyles. The diactinal forms, usually strongyles, are frequently centrotylote, but their occurrence points out an interesting suggestion of relationship to various genera of the Pœcilosclerina, such as *Myxilla* for instance. The microscleres are euasters only.

Paratimea galaxa new species

This specimen, the holotype, U. S. Nat. Mus. Cat. No. 22430, was dredged on June 25, 1932, west of White Shoals, in a depth of 15 meters.

It consists of a rock, thinly covered over practically its entire surface with sponge, which latter is mostly less than 1 mm. thick, but here and there approaches 2 mm. The rock is about 4 cm. in diameter. The sponge was reddish to brownish orange in life, and now is gray in alcohol. Its consistency is mediocre. Its surface is smooth with a very thin (but detachable) dermis, which contains openings varying in diameter all the way from 25µ up to at least 100µ, and perhaps larger. One can not say precisely which are exhalent and which are inhalent. Because of the very interesting spiculation of the sponge and the faint possibility that some of the forms might not be proper, samples were carefully studied from eight locations on the sponge, representing as nearly as possible all sides of the rock and its associated sponge. The same spiculation and the same other details were found, with only a very few exceptions, to be true of each of the eight locations. The dermis, which is scarcely over 10µ thick, has elongated thickenings in it, so that it sometimes appears fibrous. It also contains numerous tornotes, tangentially arranged, and fairly numerous spherasters of all the size ranges. Beneath this ectosome there are small but widely distributed tufts of the tylostyles arranged with the points outward and in general suggesting the structure often referred to as plumose. On some, but not all, of the places studied, there were in the endosome tracts packed with the tornotes. The plumose tracts of tylostyles are about 115µ in diameter, but those of the tornotes are only about 40µ in diameter. Here and there in the flesh are great bunches of the spherasters. The tornotes approach strongyles in shape and are nearly uniform in size, namely about 2 by 180μ. The tylostyles are about 6 to 8μ by 340μ. The spherasters range from about 6 to 16μ in total diameter, with a great many intermediates existing. The smallest ones show faint microspining on the rays when studied with the immersion objective.

There are apparently no very close relatives to this interesting sponge. The separable dermis with special dermal diacts is so strongly suggestive of the Myxilliidæ, for which a family is erected, that one is tempted to set up an entire family group just for the genus *Paratimea.* Were there numerous forms similarly separated from others of the Choanitidæ, I believe we would have no hesitation in erecting such a family, but I am reluctant to establish it for only one genus.

Scope of the Subfamily

Other genera of the subfamily Timeinæ include the following: *Columnitis* Schmidt is a synonym of *Timea. Diplastrella* Topsent has diactine microscleres in addition to the euasters, the megascleres being quite typical. *Timea* Gray has the simple spiculation of tylostyles for megascleres, and euasters (frequently tylasters) as microscleres. There exists a group of species which is somewhat more suggestive than most of the others here of *Tethya,* and even more so of *Placospongia,* in that the euasters are spherasters. There are also occasionally styles added to the tylostyles as megascleres. For this group I propose the new generic name *Kotimea* to have as genotype *Hymedesmia moorei* Carter (1880, p. 472). A second species should be transferred here; it is *Hymeraphia spiniglobata* Carter (1879, p. 301). *Xenospongia* Gray has a spiculation much like that of *Tethya,* but very different habitus.

SUBERITIDÆ Schmidt

This family as here understood comprises genera having a spiculation of tylostyles as megascleres, and no microscleres at all. As a result of this assumption, generic distinctions are based almost entirely upon external form and the arrangement of spicules. Some of these items are very significant indeed and some are exceedingly fine distinctions, perhaps not justifiable as bases for generic differentiation. In view of the fact that it is well known that microscleres may occasionally be lost from a species, although perhaps not quite as commonly as assumed in some recent publications, it is interesting to note that there may be very close relationship between certain of the genera in the Choanitidæ and those in the Suberitidæ.

In general the Suberitidæ have radiate to subradiate body plan, but the frequency with which fibers occur indicates that this is produced by emphasis on numerous ascending tracts resembling those in the Axinellidæ and Ophlitaspongiidæ. As in the Axinellidæ, there are conspicuous vertically placed dermal spicules. *Rhizaxinella* has been used as a generic name for sponges very much like *Suberites* in most respects, but which are elongate stipitate, so that they come to resemble Axinellids. Four species of this family occur at the Dry Tortugas.

LAXOSUBERITES Topsent

In this genus the tylostyles are chiefly in confusion, although at the surface they are arranged in brushes or tufts with the points outward. It differs from *Suberites* in that its ectosomal spicules are not conspicuously different from those in the endosome and by its lack of symmetrical arrangement of spicules. On the basis of published descriptions it would appear that three species now ascribed to the genus should be transferred to *Suberites.* They are *L. durus* Stephens (1915,

p. 37), *L. incrustans* Stephens (1915, p. 36), and *L. ectyoninus* Topsent (1900, p. 189). This genus is represented from the West Indian region by the species also found at the Dry Tortugas and described below.

Laxosuberites cœrulea (Carter) de Laubenfels

This specimen was collected on the underside of a loose mass of long-dead coral on the Bush Key Reef, June 30, 1932. When collected it was at low tide and was barely submerged at all.

The mass is 8 cm. in diameter and 14 mm. thick at the maximum. Much of it is less than 10 mm. thick. The color was a gorgeous lovely blue in life, and even in alcohol after some weeks it is still a rich clear blue, slowly fading as the months go by. The consistency is slightly elastic, but very delicate, easily cut and torn. The surface is minutely tuberculate, but superficially appears smooth. The dermis is in many places scarcely 20µ thick. It is fleshy, firmly attached to the outmost bits of the skeleton, so that it can not be readily detached, and is pierced with numerous circular apertures 70 to 200µ in diameter. They give some evidence of being closeable by sphinctrate action. It is possible that the few larger ones are oscules and the many smaller ones are pores, but no sharp distinction can be drawn between the two. The endosome is the type known as "crumb-of-bread," both to the naked eye and microscopically, there being a coarser structure made up by masses of a similar finer structure. There are large meandering canals 3 mm. in diameter, there are numerous chambers about 700µ in diameter, and then others 45µ, and still another size range 20µ. Presumably only those of the latter size are true flagellate chambers, those 45µ in diameter being only dubiously so. Choanocytes were not made out with certainty in either size. Throughout the endosome the spicules are in utter confusion, pointing in all directions. They are confined in the sheets of tissue outlining the canals and chambers. Near the surface rather more of them point outward than in any other direction. The spicules are all tylostyles with exceedingly small heads, so that they appear superficially almost as though they were merely styles. There is great variation in size, but in general the largest are not also the thickest. Typical sizes are 5 by 315µ, 4 by 365µ, 2 by 480µ.

Carter (1882, p. 355) described from Great Britain a sponge under the name of *Terpios cœrulea*. In 1932 (p. 88) de Laubenfels transferred this to the genus *Laxosuberites*. It is very like the West Indian form now under discussion, except that the heads to the tylostyles are somewhat more distinct. This may be a sufficient reason to establish a new species for it, but I hesitate so to consider it at this time, and therefore regard the Dry Tortugas species, pro tem at least, as being the same as the British one.

PROSUBERITES Topsent

In this genus practically all the megascleres are arranged perpendicularly to the substratum, with the points erect. The sponge is very thin because the flesh does not extend up and above the spicules. All of the latter are of practically the same size. Brøndsted, 1924, on pages 163 and 161, respectively, describes two sponges as of the genus *Suberites*, the first being *ramosus* and the second *anastomosus*. Burton (1930, p. 334) transferred each of these to *Prosuberites*, but Brøndsted's original description states plainly that the dermal spiculation is of megascleres distinctly smaller than those of the endosome and that the structure is not thinly encrusting, but massive. This is by definition the form of *Suberites*, and I therefore propose that both of these species be returned to that genus. The type of *Prosuberites* needs to be fixed as the species *longispina* Topsent (1894, p. XLII).

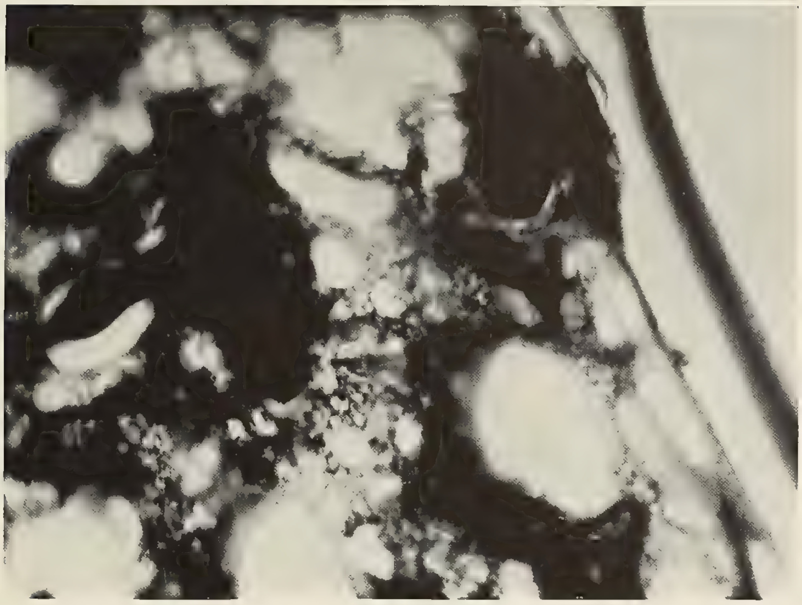


Fig. 1

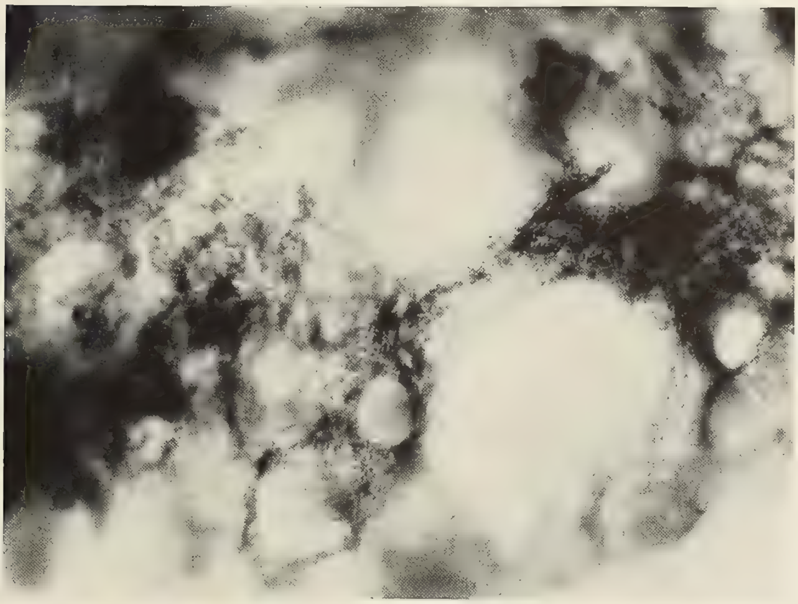


Fig. 2

Photomicrographs of sections of sponges, x 80. Figure 1, *Iotrochota birotulata*. At the extreme upper right, it is outside the sponge entirely. Then, traveling toward the lower left, the first dark line is section of dermis over a præoscular channel, which shows as light area. Next the outer surface of the endosome appears, with exhalent apertures evident. Below is the mass of endosome. Very dark blotches are sections of fiber. Large light circles are sections of canals. In the very center some regions of flagellate chambers show plainly. Figure 2, *Pseudosuberites melanos*.

This genus is represented from the West Indian region according to Topsent (1933, p. 34) by the species which Lamarck described in 1815 (p. 163) as *Alcyonium epiphytum*, and also by the Dry Tortugas species to be described below.

Prosuberites microsclerus new species

This specimen the holotype, U. S. Nat. Mus. Cat. No. 22493, was collected on Bush Key Reef, June 30, 1932, from the underside of a boulder that was barely submerged at low tide.

This is a thin encrustation scarcely 500µ thick and covering about 1 sq. cm. Its color in life was chrome yellow, and in alcohol it has faded only a little. Its consistency is not readily made out because of the thinness. The surface is microscopically hispid. The structure is somewhat confused, but the majority of the spicules stand erect on the substratum. Those that do not do so apparently are displaced in order to make room for the chambers. The spicules are of one sort only, styles with a tylote swelling near the base, or actually tylostyles. The diameter is rather constantly 2µ, but the length varies from 125µ to at least 250µ.

This species is sharply separated from all the others in *Prosuberites* by the exceedingly small size of the spicules, most of the other species having them many times as large. The peculiar subtylote shape is found in one other, at least, which is *epiphytoides* Thiele (1905, p. 420), from the extreme southern portion of South America. This, like the others mentioned above, has spicules much larger than those in *microsclerus*.

PSEUDOSUBERITES Topsent

In this genus the megascleres are confused within the endosome as in *Laxosuberites*, but the group is sharply separated from that and most other genera in the family by the fact that there is a special dermal skeleton in which the megascleres, otherwise very like those in the endosome, are arranged in a tangential layer over subdermal spaces. This is suggestive of the Halichondiidæ of the Halichondrina, rather than of the Axinellidæ as is true of most Hadromerine sponges. Vague tracts of spicules are sometimes present. It is not entirely typical of the Hadromerina; it might, for example, be an unusual member of the family Ophlitaspongiidæ. The dense, subspherical form is characteristic of the Hadromerina, of course, but is shown by several genera here regarded as being Ophlitaspongiid, namely *Artemesina*, *Camptisocale* and *Phelloderma*. *Pseudosuberites* is represented in the West Indian region apparently only by the form to be described below.

Pseudosuberites melanos de Laubenfels

Plate 17, fig. 2.

The principal specimen, U. S. Nat. Mus. Cat. No. 22431, was observed on the back of a living crab in an aquarium of running sea-water on June 18, 1932. The crab with the sponge on it had been collected in the neighborhood of Bird Key Reef about a week earlier. On June 13, 1927, I found an example of this species in the moat at Fort Jefferson. I have since seen another specimen in the collections of the U. S. National Museum from the West Indian region, which (Cat. No. 22360) was made the holotype of the species; see de Laubenfels 1934, p. 9.

This is a massive to lobate sponge, reaching a maximum thickness of at least 2 cm. and covering an area of as much as 15 sq. cm. The lobate projections mentioned above are rounded but unsymmetrical protrusions less than 1 cm. in diameter. The color of the exterior was slaty black in life, but the interior was dull drab. These colors have faded very little in alcohol. The consistency is softly spongy, compressible, but cutting and tearing easily. The surface over the protrusions is smooth, provided with a definite fleshy dermis only 15 to 30μ thick, under which are very noticeable subdermal cavities. These latter, while only about 200μ in height, are very extensive over the surface of the sponge. The dermis contains spicules tangentially arranged but otherwise in confusion, and is supported above the cavities by pillars of spicules in which columns the points are directed toward the surface. These columns flare out like cone-shaped capitals just below the dermis, supporting it. Their diameter is 100 to 170μ. The bulk of the endosome is like the structure of bread, full of rounded cavities, which in this species are roughly from 150 to 500μ in diameter. The solid flesh is arranged in sheets around these hollows, with the spicules strewn in confusion in the lamellate structures. Again, here and there, are vague tracts of spicules about 40 to 100μ in diameter, extending in general toward the surface and becoming well organized only as they approach it. At the surface the spicules diverge as mentioned above. The megascleres are tylostyles with well-marked heads, and shafts that are rather thick in the mid-region, not very sharply pointed. There is very great variation in size, from at least as small as 3 by 125μ to at least as large as 6 by 285μ. There appears to be no localization of any size range in any region of the sponge, nor are any microscleres to be found.

This species is apparently most sharply separated by its peculiar color, furthermore but few other species in the genus have such small spicules. The other one having the black color is described as *Suberites montiniger* by Carter (1880, p. 256) and is an Arctic species.

RADIELLA Schmidt

This genus has some styles as spicules in addition to tylostyles. It is chiefly characterized by its peculiar external shape, which in general is hemispherical with an equatorial fringe of enormous projecting spicules.

Radiella sol Schmidt

Plate 22, fig. 2.

Six specimens of this species were dredged July 30, 1932, from the Gulf Stream about half-way between Cuba and the Dry Tortugas, at a depth of 1047 meters.

This species is an oblate spheroid or hemisphere, usually with equatorial diameter twice the polar diameter. The upper (?) surface is much the more convex. At the periphery or equator, a disk of radiating spicules extends to a considerable distance. The equatorial diameter of the spheroids of the six specimens varies from 7 to 13 mm.; the total diameter, including the above-mentioned fringe, from 10 to 18 mm. The color is grayish white, the consistency is firm. The pores and oscules are not visible, perhaps obscured by the dermal plush and its contained detritus. A description of a cross-section of a medium sized specimen may be given to indicate the structure of the species. At the surface is a plush of projecting spicules, points out, extending in the polar regions 700μ beyond the surface, embedded nearly as far within it. In small specimens, in the center of the disk, this plush may be as short as 400μ high only. Toward the equator it increases in size, first gradually, then more and more rapidly, until directly at the equator it projects sometimes as far as 5 mm. The surface proper is recognized most readily as being the lower limit of the foreign detritus. A fleshy membrane is probably present but could not be demonstrated plainly. There is very plainly present a region, 100μ thick, of abundant spicules in confusion, but nearly tangential in placement, just below the above-mentioned limit of foreign material and hypothetical membrane. Below the zone of tangential spicules is a region some 600μ thick, of subdermal spaces transversed by relatively few spicules, which when present are chiefly those that make up the spicule plush mentioned above. Beneath the region of subdermal spaces occurs a region of some 600μ of ground substance containing only small chambers. Then is found a region about 100μ thick of relatively large canals, mostly arranged parallel to the polar surfaces, perpendicular to the equator, but in its plane. Below this about 700μ is given over again to the ground substance containing only small chambers. Then at the base of the sponge, or what may be described as the lower polar surface, is a layer about 500μ thick that is merely a densely matted mass of spicules. The regions mentioned above under the heading of ground substance contain the bulk of the protoplasmic structure of the sponge, and in them the spicules are not only in confusion, but very small in size. Many canals are rather flattened in cross-section, being for instance 100 by 500μ. The spicules are large-headed tylostyles which may be roughly divided into two categories, since two diameters predominate. The thinner are about 9μ thick and vary in length from 270 to 670μ. The larger are often 15μ thick, though varying from 10 to 25μ and range in length from 205 to 5000μ, or perhaps even as much as 7000μ.

This species seems to have no very close relatives. It was described from the West Indian region by Schmidt (1870, p. 48).

Scope of the Family

Other genera belonging to the family Suberitidæ may be discussed as follows: *Aaptos* Gray has many styles in addition to the principal spiculation, which is merely subtylostylote instead of conspicuously tylote. The genotype, *Aaptos aaptos* (Schmidt, 1864, p. 33) is a West Indian species, originally described as of the genus *Ancorina*. *Atergia* Stephens has, in addition to two sizes of tylostyles, some small oxeas which may be regarded as microscleres or as small megascleres, it is not clear which. This should receive in synonymy the species described by Carter (1876, p. 395) as *Cometella simplex*. *Cometella* Schmidt is separated from other genera in the family chiefly by its peculiar external form. Its genotype needs to be understood as *C. gracilor* Schmidt (1870, p. 49), which is a West Indian species. It is enormously stipitate with a relatively small subspherical main body. *Hymerhabdia* Topsent has rhabdostyles and peculiar twisted tylostyles, in this respect being very much like the genus *Rhabderemia* discussed above, except that it does not have any microscleres. *Laxosuberella* Burton has tylostyles only. It differs from *Laxosuberites* in having special pore areas, and differs from *Spheciospongia*, described above, in that it has no spirasters. *Polymastia* Bowerbank is differentiated for the unusual sort of surface, which is given over to very long fistules in places. *Poterion* Schlegel is set apart for its vase-like external shape. It is also notable for its exceedingly large size. *Protosuberites* Swartschevsky has smaller ectosomal tylostyles, over larger endosomal ones, which latter are perpendicular to the substratum. It is therefore like *Prosuberites* except that it has a special dermal skeleton resembling that of *Suberites*. It is like this latter genus except that it has the simple erect endosomal skeleton. It should receive in synonymy *Protosuberites sagamensis* Thiele (1898, p. 40). Its genotype needs to be understood as being *P. prototypus* Swartschevsky (1905, p. 36). *Ridleia* Dendy is characterized chiefly by the peculiar flask-shaped hollow habitus. It also has, as in the genus *Suberites*, smaller ectosomal tylostyles over larger endosomal ones. It should receive in synonymy the species described as *Suberites oculatus* by Kieschnick (1896). *R. dendiia* de Laubenfels (1934, p. 10) is West Indian. *Sphærotylus* Topsent is very like *Polymastia* except that some of the tylostyles have that modification of their points that causes them to be known as exotyles, whereby there may be made interesting comparisons to the genera *Tylexocladus* and *Siphonidium*. *Stylospira* de Laubenfels has as megascleres peculiar spirally twisted styles. The microscleres are rhaphides. The one species, *S. mona* de Laubenfels (1934, p. 10) is West Indian. *Stylotella* Lendenfeld differs from *Suberites* chiefly in the fact that a relatively large number of the spicules, but not all, are styles rather than being tylostyles. The following species originally described as being of this genus, are properly to be transferred to *Hymeniacidon: aplysilloides* Lendenfeld (1888, p. 187), *conulosa* Topsent (1897, p. 466), *gorbunovi* Rezvoy (1932, p. 510), *timonovi* Rezvoy (1932, p. 512); also, the following species that have been transferred to *Stylotella* should instead be transferred to *Hymeniacidon: Chalina inornata* Bowerbank (1874, p. 277), *Isodictya invalida* Bowerbank (1874, p. 289), *I. pertenius* Bowerbank (1882, p. 144). *Suberites* Nardo is characterized by simple spiculation of larger tylostyles in the endosome, with smaller in the ectosome, with no microscleres. The name *Suberites inconstans,* as used by Dendy (1887, p. 154), was preoccupied in 1885 by Hansen and therefore a new name is needed, for which I propose *arndti.* This species is certainly not a *Suberites,* however, but probably should be transferred to the genus *Cliona* on the basis of evidence offered by Burton (1934, p. 570). The genus *Terpios* Duchassaing and Michelotti is characterized by the quadrilobate form of the heads of spicules that otherwise would be regarded as tylostyles. There are also proper tylostyles present. The genotype *T. fujax* Duchassaing and Michelotti (1864, p. 102) is a well-marked West Indian species. The other forms referred to this genus by Duchassaing and Michelotti are also West Indian, but need to be transferred to other genera; *aurantiaca* (p. 99) is probably a *Laxosuberites,* although this is by no means certain, and the other West Indian forms are best described for the present as unrecognizable. *Terpiosella* Burton would seem to be very close to *Protosuberites.* There are larger and smaller tylostyles erect upon a substratum which is ordinarily a Thallophyte.

There are also some very dubious genera which need consideration here. *Bursalina* Schmidt is not well known, it is almost certainly a synonym either of *Suberites* or of *Quasilina*; it seems impossible to be sure which at the present time. *Clathroscula* Merjeskowsky is not well described; it may possibly be a synonym of *Polymastia.* *Gilchristia* Burton is a very peculiar sponge, with larger styles and smaller tylostyles; it occurs in symbiosis with another species of sponge. *Hallmannia* has in addition to the larger tylostyles, smaller slightly curved ones which may be regarded as microscleres, in which case the family Suberitidæ would not be appropriate. This genus was established by Burton (1930, p. 519), having then as its only species *Biemna aruensis* Hentschel (1912, p. 352); this therefore must stand as the genotype, in spite of the fact that Burton (1931, p. 352) makes the statement that his species *spirophora,* new on that page, should be considered as the type. *Hymeraphia* Bowerbank is a very peculiar genus. All the spicules of this exceedingly thin sponge are perpendicular to the substratum. There are larger simple tylostyles and smaller tylostyles of which the pointed ends are profusely spined. The species described as *Hymeraphia unispiculum* Carter (1880, p. 467) probably should be transferred to the genus *Aaptos.* *Isociella* Hallmann would appear by definition not to be in the family Suberitidæ, since there are very few tylostyles present, but the general architecture, especially the dermal palisade of small monaxons over an endosomal spiculation of much larger monaxons renders it almost certain that this is the correct family. This should receive in synonymy the species described as *Phakellia lobata* by Wilson (1902, p. 399), which is a West Indian species. *Proteleia* Dendy and Ridley is very suggestive of the above mentioned *Hymeraphia.* There are conventional tylostyles, to which are added other similar spicules having at the pointed ends four recurved clads, strongly suggestive of the genus *Acarnus* of the family Myxilliidæ, in the order Pœcilosclerina. If nothing else, this certainly indicates there the very close relationship among all the genera of sponges in the entire class Demospongiæ. *Quasilina* Norman contains both styles and tylostyles, the spicules being in bundles at right angles to each other. *Tentorium* Vosmaer is very closely related indeed to *Suberites*, but may be separated for peculiar architecture. *Trachytelia* Topsent differs from *Suberites* chiefly, it would seem, in that many of the spicules (particularly the larger ones) are microspined near their tips. *Tylexocladus* Topsent, somewhat like *Sphærotylus*, has the exotylote modification of the otherwise suberitid spicules. *Vosmæria* Fristedt differs from *Suberites* by possessing large oxeas in addition to the tylostyles. Note that this is not the *Vosmæria* of Lendenfeld, a Calcisponge, to be discussed below.

Other generic names which need to be considered in this connection include the following: *Lithumenia* Lieberkühn (or Renier) is a synonym of *Suberites. Litumenia* Nardo is unrecognizable. *Mesapos* Gray is a synonym of *Hymeraphia. Pencillaria* Gray is a synonym of *Polymastia. Rhaphidorus* Topsent is a synonym of *Polymastia. Rhaphiophora* Gray is a synonym of *Poterion. Rhizaxinella* Keller is a synonym of *Suberites. Rinalda* Schmidt is a synonym of *Polymastia*, as is also *Spinularia* of Gray. *Suberanthus* Lendenfeld is a synonym of *Suberites. Suberella* Burton is a synonym of *Laxosuberella. Tethyophæna* Schmidt is a synonym of *Aaptos*, and *Thecophora* Schmidt is a synonym of *Tentorium. Trachya* Carter and *Tuberella* Keller are synonyms of *Aaptos*, and *Trichostemma* Sars is a synonym of *Radiella. Weberella* Vosmaer is a synonym of *Polymastia.*

PLACOSPONGIIDÆ Gray

This family has as its megascleres the tylostyles typical of the entire order Hadromerina, but as microscleres has, in addition to ordinary euasters and spherasters, sterrasters as characteristic otherwise of the family Geodiidæ in the order Choristida. This indication of possible relation to another order is a chief reason for separating the genus from the otherwise somewhat similar sponges of the Timeinæ.

PLACOSPONGIA Gray

This genus, the only one in the family Placospongiidæ, has a spiculation as mentioned above. It has a very hard ectosome, divided into polygonal areas by grooves which contain pores. Another genus which has almost identical external form and therefore needs attention here is *Didiscus* of the Phorbasidæ. The hardness of this dermis is produced by the presence of enormous quantities of the sterrasters localized in that place instead of being distributed throughout the sponge. In this, as in many other respects, the genus closely resembles the tetraxonid *Geodia. Physcaphora* Hanitsch is a synonym of *Placospongia.*

Placospongia melobesiodes Gray

This specimen was on a block of oolithic limestone which was dredged June 26, 1932, from a depth of 70 meters, southeast of Loggerhead Key.

It is an encrustation 1 mm. thick and covered about 4 sq. mm. of the rock. It was brownish orange in life and is stony hard in consistency, it is smooth and even of surface, with cracks dividing the surface vaguely into polygonal areas. It was scraped off with such care that even some of the underlying rock was removed, in spite of which there seems to be nothing but ectosome present. Not a trace of the megascleres could be found. The only spicule sort present was a sterraster about 53 by 61 by 70μ.

While sterrasters of this type are characteristic, as mentioned above, of the dermal armor of *Geodia*, they are also found in *Placospongia.* Strictly speaking the specimen under discussion is unrecognizable, but the color and the general pattern of the surface is decidedly that of *Placospongia*, and is seldom if ever found in the genus *Geodia.* Furthermore, *Placospongia melobesiodes* Gray (1867, p. 127), which is the type of the genus *Placospongia*, is a West Indian form. The probabilities are therefore very high that this is that species and identification is therefore tentatively made.

CLIONIDÆ Gray

This family has the spiculation of *Spirastrella* in the family Choanitidæ, namely megascleres that are tylostyles (chiefly in confusion) and microscleres that are spirasters. If, as is often the case, it is to be regarded as a valid family, it must be set off from others strictly on the basis of this, that the genera and species referred here (during at least the early portion of their lives) bore holes in calcareous material and live in the resulting cavities. There is dispute as to whether this boring is accomplished by mechanical means or by acid. *Cliona* portions without spicules still bore, so evidently the digging is not with them. Free acid can not be detected, so if any is used it must be immediately neutralized. An interesting mechanical hypothesis was advocated by Letellier in 1894. In many places in the works of Topsent, important discussions of the Clionidæ are presented. The inhalent and exhalent apertures are commonly on little papilles that protrude from the calcareous substance in which the bulk of the sponge is buried.

The family Clionidæ needs to be divided into two subdivisions, dubiously to be termed subfamilies. *Thoosa* and its related genera, which have elaborate or fancy microscleres, constitute one, and *Cliona* with its relatives that have simpler microscleres constitutes the other. This will be considered first.

CLIONA Grant

This genus is typical of the family and subfamily and answers in general to the description made above. Among the microscleres, in addition to the spirasters, there are often also small oxeas. As individuals of this genus grow older, they protrude farther and farther from their calcareous caverns until there may be a mass of several kilograms of sponge in which the original beginning with its surrounding mineral material can scarcely be found. Bowerbank considered these older *Clionas* to be a separate genus, *Raphyrus*; they resemble several genera of the Choanitidæ and Suberitidæ, such as *Poterion*, *Gapoda* and *Spheciospongia.* *Cliona* should receive the species described as *Spirastrella aurivilli* by Lindgren (1897, p. 484), to judge by the evidence presented by Burton (1934, p. 571). This genus is well represented in the West Indian region. *Vioa strombi* Duchassaing and Michelotti (1864, p. 113) and *V. dissociata* Duchassaing and Michelotti (1864, p. 112) are certainly of this genus, although specifically unrecognizable. *Papillina arenosa* Schmidt (1870, p. 48) is similarly unrecognizable, except that it belongs to the genus *Cliona.* The following species described as of the genus *Cliona* are West Indian; *viridis* Schmidt (1862, p. 77), *phallica* Leidy (1848, p. 67), *subulata* Sollas (1878, p. 65), and *vermifera* Hancock (1867). None of these is very readily recognizable, with the possible exception of *viridis,* which has a green color not common in sponges. There is in addition from the West Indian region the following, also recorded at the Dry Tortugas:

Cliona caribbœa Carter

This species is abundant in the vicinity of the Dry Tortugas, especially boring in dead coral, but also in shells, and even in limestone rock, as was true of the specimen put up for anatomical study. This was dredged June 26, 1932, from a depth of 70 meters, southeast of Loggerhead Key.

This species excavates canals through calcium carbonate and lives in these openings, but may grow so large as to extend out in masses of considerable size. The oscules and pores of the excavating forms are situated on little papillate structures that protrude. In life it is rich yellow, the consistency corky to cheesy. The specimen prepared for microscopical study, as mentioned above, is remarkable for the very large size of some of its galleries. They may, to be sure, have been excavated by some other force or organism and then merely have been appropriated by the sponge, but this does not seem plausible; the indications are simply that we have here some extra large excavations made by the *Cliona.* They reach a diameter of at least 6 mm., in which cases the sponge itself is only 1.5 to 1.8 mm. thick, being therefore a mere lining in the gallery, leaving a lumen 2.5 to 3 mm. in diameter surrounded by the sponge itself. The spicules, scattered throughout the flesh in abundance and confusion, are large-headed tylostyles of considerable variation, especially in their thickness. They range from at least as small as 6 by 240μ to at least as large as 16 by 310μ.

Cliona celata Grant (1826, p. 79), the type of the genus, is by many authors regarded as being cosmopolitan, and there exists a very considerable possibility that this sponge from the West Indies is merely one variation of this wide-spread species. The Dry Tortugas sponge, however, very frequently has spicules that are slightly polytylote and has these extra large galleries mentioned above. It is clearly conspecific with *caribbœa* of Carter (1882, p. 346), and since it is not absolutely certain that it is conspecific with Grant's species, I prefer for the present to identify it only with that of Carter.

Scope of the Family

Among the other genera referable to the family Clionidæ we find the following: *Amorphinopsis* Carter is very puzzling. Much of the type specimen inhabited galleries in dead coral. If these had been excavated by the sponge, it might be compared to *Aka* (see below) with a few styles in the spiculation. That which protruded from the galleries was lamellate rather than papillate as in typical Clionidæ. This portion was suggestive of the Axinellidæ. On the other hand, to put the genus in this latter family is no less subject to criticism than, as here dubiously decided, to leave it in the Clionidæ. *Aka* new genus is here proposed as a new name for *Acca* of Johnson, that name being preoccupied. This genus has only oxeas, which it will be noted occur along with the other spicules in some species of *Cliona.* The genotype should be established as *Acca insidiosa* Johnson (1899, p. 462). Two species described originally as *Cliona* should be transferred here. They are *coralliophaga* Stephens (1915, p. 26) and *labyrinthica* Hancock (1849, p. 340). *Clionopsis* Bailey has mostly oxeas, in that respect resembling *Aka,* but there are also a few typical tylostyles. The microscleres include not only long thin spirasters, but some very short stout ones that bear superficial resemblance to euasters. *Donotella* new genus is here proposed for species which like *Aka* have as megascleres only oxeas and have as microscleres very short thick streptasters. The genotype is established as *Cliona acustella* Annandale (1915, p. 14). To this also should be transferred *Cliona levispira* Topsent (1898, p. 235) and *Cliona pruvoti* Topsent (1900, p. 104). *Scantiletta* new name is here proposed for *Scantilla* of Johnson, which is preoccupied. This genus comprises only oxeas as principal spicules with spirasters as microscleres.

There are the following names which are all synonyms of *Cliona. Archæocliona* Czerniavsky, *Euryphylle* Duchassaing and Michelotti, *Idomon* Gray, *Myle* Gray, *Osculina* Schmidt, *Papillella* Vosmaer, *Papillina* Schmidt, *Papillissa* Lendenfeld, *Pione* Gray, *Pronax* Gray (this is the first of the two genera to which Gray in the same article gave the name of *Pronax*), *Raphyrus* Bowerbank, *Sapline* Gray, *Taguilla* Bowerbank, *Tapiliata* Bowerbank, and *Vioa* Nardo.

The genera exemplified by *Thoosa* differ from the Clionidæ proper in that the microscleres are peculiar, often elaborate forms, and not just simple spirasters. One might regard this as a separate subfamily, the Thoosinæ Cockerell, but there exist intermediates (see *Dotona*) and furthermore the differences between this group and typical Clionidæ are not great.

Among the genera referred to this subdivision are the following: *Alectona* Carter has very peculiar tuberculate, centrotylote strongyles as megascleres, as well as elaborate amphiastrose microscleres. The genotype should be established as *A. millari* Carter (1879, p. 494). The species described by Carter (1879, p. 353) as *Corticium wallichii* should be transferred into synonymy here. *Amphius* Sollas is not certainly boring, but the spiculation agrees so closely with other members of this family that it is very plausible to leave it here. It has oxeas and tylote amphihexasters. *Annandalia* Topsent differs from *Thoosa* chiefly in the addition of large numbers of oxeas and in greater variety of microscleres. *Cliothosa* Topsent is even closer to *Cliona* than other members of this group. It has typical tylostyles for its megascleres, as in *Cliona* but the microscleres are tylote amphiorthotetrænes or amphihexasters, as in *Thoosa.* It should receive in synonymy the species described as *Cliona carpenteri* by Hancock (1867). *Delectona* new genus is hereby established to have as genotype a species described by Carter (1880, p. 58) as *Alectona higgini.* This is done with some hesitation. It is certainly not quite the same as any other genus of sponge in the world, but the chief doubt is as to whether it is even a sponge at all. Little is known of the flesh or soft parts, and only one type of spicule is described, which is a rhabd frequently subdivided by spiny or lumpy subspherical swellings. This is vaguely suggestive of some of the spicules described in other sponges related to *Thoosa,* but is by no means to be regarded as a satisfactory proof that its manufacturer was a sponge. *Dotona* Carter has only oxeas as megascleres and two peculiar sorts of microscleres, strongly suggestive of *Donotella* and *Scantilletta. Dyscliona* Kirkpatrick has strongyles for megascleres and microscleres resembling those found in others of this subfamily. *Nisella* Johnson is very much like *Amphius* mentioned above, but has euasters, that is to say tylasters, in addition to the sort found in the group in general. *Thooce* new genus is hereby established for a group of species not having any megascleres at all, but having microscleres similar to those very characteristic of *Thoosa.* The genotype is established as *Thoosa socialis* Carter (1880, p. 56), and other species transferred here include *T. amphiasterina* Topsent (1891, p. 583) and *T. circumflexa* Topsent (1920, p. 91). Finally there is the genus *Thoosa* Hancock, of which the genotype needs to be established as

Thoosa cactoides Hancock (1849, p. 345). The megascleres have a centrotylote swelling from which sometimes two or three pointed shafts radiate as though several tylostyles had stuck together at their swollen heads. The microscleres are peculiar astrose forms best described by illustration. *Thoosa letellieri* Topsent (1891, p. 580) should be transferred to *Alectona*.

GASTROPHANELLIDÆ new family

This family is here established for a small group of genera of lithisted sponges, which by reason of their possession of tylostyles or exotyles give pronounced indication of close relationship to the Hadromerina in general, and perhaps to the Suberitidæ in particular, conceivably having been derived from that, or related families, by malformation of the spicules.

The first genus here referred to this family is *Aciculites* Schmidt, which, however, is one of the most dubious of all the genera here so treated, inasmuch as there are strongyles present, giving an indication of possible relationship to the family Myxillidæ. The typical genus is *Gastrophanella* Schmidt, which has tylostyles and monocrepid desmas. *Poritella* Schmidt has styles as well as the tylostyles and monocrepid desmas. Finally *Siphonidium* Schmidt has exotyles as well as the lithistid spicules, some indications of Polymastid relationship, and in many ways is strongly suggestive of the genus *Sphærotylus* Topsent of the Suberitidæ. Several of the above are West Indian forms, for instance *Aciculites higginsii* Schmidt (1879, p. 29), *Poritella decidua* Schmidt (1879, p. 27), the type of that genus, and *Leiodermatum ramosum* Schmidt (1870, p. 21), the type of *Siphonidium*.

EPIPOLASIDA Sollas

All the orders of sponges contain genera and families that may have been derived from other genera and families by the addition of new elements or loss of old ones, and therefore are open to the suggestion that they may be polyphyletic, but of the order here proposed this criticism is somewhat more appropriate even than for the others. The sponges referred to families discussed under the heading of Epipolasida are very much like those in the order Hadromerina, with the exception of the fact that instead of having any tylostyles the principal spicules are oxeas and occasionally styles. Both of these types of spicules occur along with the characteristic microscleres in the Hadromerina, accompanied in that case by the tylostyles. Merely losing this latter type of spicules from Hadromerina would leave as the result the typical Epipolasid sponge, and it may indeed be that various species referred to this order have been so arrived at. Similarly the sponges of the order Choristida, which have tetraxon spicules characteristically present, also have the oxeas and astrose microscleres and, as may conceivably be the case, by merely losing the tetraxon spicules the residue would be a so-called Epipolasid sponge. On the other hand the decided possibility exists that these constitute a distinct category of sponge; there is no direct evidence to the contrary. Suppose we do make the assumption that they have been reduced from other forms, then there seems to be no way of telling which have been derived from the Hadromerine or which from the Choristid families. Another possibility, hinted at above, is that instead of being reduced or degenerate forms, they may be primitively simple. For instance, they might conceivably be ancestral to the Hadromerina, sponges that have not as yet developed the tylostylote modification.

Sollas proposed the name in 1888 (p. 177) as for a family. It is here for the first time raised to full rank as an order. It is here further divided into families, largely on the basis of the type of microscleres present or absent. This, as discussed in connection with the families of the Hadromerina, is admittedly a very fine distinction to draw, but as in the order Choristida it has frequently been done in the past, and one needs only to follow precedent to continue this course of action.

JASPIDÆ new family

This family contains genera with exclusively monaxon megascleres; their microscleres are astrose. It is divided at once into two subfamilies, the first to be considered being the following.

RHAPHIDISTIINÆ new subfamily

This group corresponds in general to Streptasteridæ Hentschel (1923) but with a somewhat different assortment of genera referred here. The name Streptasteridæ is not tenable because of the lack of any sponge genus name "Streptastera." In this family, in addition to the megascleres of principally oxeas, there are microscleres that are streptasters with or without the addition of euasters, in contrast to the subfamily Jaspinæ to be discussed later, which has only euasters. The architecture is typically decidedly radiate. Apparently all the species often have a conspicuous cortex about them, but each species may be represented by individual sponges that lack this feature. This family is poorly represented in the West Indian region, but there is one Dry Tortugas species that belongs here.

TRACHYGELLIUS Topsent

This genus is characterized by having as its principal spiculation very large oxeas, to which are added microscleres that are small sigmas. These latter do not taper sharply to points as do the ordinary sigmas of Pœcilosclerina. Their tendency to spiral shape and rather blunt terminations is probably to be regarded as indication if not even actual proof that they are spirasters with greatly reduced spination.

The genus *Trachygellius* is not at all common, being reported hitherto chiefly from the Australian region, where it is represented by the one species, *globosa.*

Trachygellius cinachyra new species

Plate 18, fig. 1.

Two specimens were dredged June 26, 1932, southeast of Loggerhead Key, from a depth of 70 meters; one of these, U. S. Nat. Mus. Cat. No. 22433, is the holotype.

Both are subspherical, the larger about 3 cm. in diameter, the smaller 2 cm. The color was a rich ochre yellow in life and has faded to drab in alcohol. The consistency is cartilaginous. Even with the microscope the pores do not show, the dermis being a sheet scarcely 15μ thick, continuous except that there are oscules about 1 mm. in greatest diameter. These oscules are oval in outline rather than round, as is more common. Projecting spicules make collars about 0.5 mm. high around the oscules of the larger specimen, and nearly 2 mm. high around those in the smaller specimens. The endosome is strongly radiate. There are fascicular bundles of oxeas perpendicular to the surface of the sponge. Each of these tracts is about 150 to 250μ in diameter. There are only scanty quantities of soft parts present, these are arranged between the spicular columns. The megascleres are very sharply pointed oxeas, some at least as small as 4μ in diameter, and many as much as 40μ, with all intermediate sizes occurring. The total lengths are usually well over 1 mm.; the larger are usually broken but were probably at least 3 or 4 mm. long when intact. In the flesh there are abundant sigmas, very contort, 6 to 11μ in greatest chord measurement, therefore probably 15μ in length along the curve. With the immersion lens they appear very minutely roughened, but scarcely more so than ordinary spicules are. Their ends are slightly rounded, sometimes almost tylote.

The one other species is the genotype, a sponge described as *Trachya globosa* by Carter (1886, p. 121). It is difficult to compare this to *cinachyra* because the sigmas of Carter's species are very briefly described and not illustrated. They were, however, only 8μ long, which is considerably smaller than those of the West Indian form. Carter's species, furthermore, was stipitate rather than simply subspherical.

Scope of the Family

Other genera that may be referred to the subfamily Rhapidistiinæ include the following: *Acanthoxifer* Dendy has two sizes of oxeas as principal spicules, and spined microrhabds as microscleres. *Alloscleria* Topsent has principal spicules that are styles, and there are two sorts of microscleres: spiny, simple microrhabds and unspined centrotylote ones. *Holoxea* Topsent has megascleres that are oxeas of two sizes, and has two sorts of microscleres; both are oxeote, the one smooth and the other spined. *Negombata* is here proposed as a new generic name for genotype *Latrunculia corticata* Carter (1879, p. 298). Its microscleres have the spines arranged almost symmetrically, in whorls, suggestive of the discorhabds of *Latrunculia* (Choanitidæ) and of *Negombo*, here placed in the Higginsiinæ. They are, however, not discorhabds. A second species of this genus is *Latrunculia purpurea* Carter (1881, p. 380). Neither it nor *Corticata* is very thoroughly described. It is even possible that *Negombata* and *Negombo* may be congeneric and neither is easily placed as to family. Both or neither may belong in the Jaspidæ, or Axinellidæ, or Choanitidæ. *Parahigginsia* Dendy has a very simple spiculation of only oxeas for megascleres and acanthomicroxeas for microscleres. *Prostylyssa* Topsent has only oxeas as megascleres, but has microstyles as microscleres. *Rhaphidistia* Carter has principal spicules that are oxeas and microscleres that are spirasters. It would appear that the species described by Topsent (1890, p. 69) as *Spirastrella aculeata* should be transferred to this genus. *Scolopes* Schmidt has two sizes of oxeas for principal spicules, and as microscleres rhabds profusely spined only at the ends. *Spirasigma* Hallmann has two types of megascleres, smaller oxeas and larger strongyles. The microscleres are spirals something like those in *Trachygellius*. Similar microscleres occur in *Spiroxya* Topsent, together with others that are microstrongyles with spines spirally arranged around them; the megascleres are simple oxeas. *Topsentia* Berg has oxeas as megascleres and microxeas as microscleres. *Trachycladus* Carter is like *Trachygellius*, but has in addition microstrongyles each with a central belt of spines.

There are also genera referable here in which there are both euasters and streptasters. *Stellettenopsis* Carter has oxeas for megascleres, spiny microstrongyles and euasters for microscleres. Its genotype needs to be understood as being *S. corticata* (1879, p. 348). *Tethyorrhaphis* Lendenfeld has oxeas to styles as principal megascleres, microacanthoxeas and euasters that are almost spherasters for microscleres.

Other names that need consideration in this connection include the following: *Algol* Sollas, *Antares* Sollas, and *Asteropus* Sollas are all synonyms of *Stellettinopsis*. *Anisoxya* Topsent, which was preoccupied, falls in synonymy with *Topsentia*. *Paracordyla* Hallmann appears to be synonym of *Scolopes*. *Spirophora* Lendenfeld is a synonym of *Trachycladus*. *Spirophorella* Lendenfeld is also a synonym of *Trachycladus*.

JASPINÆ new subfamily

This group is here established for some of the genera which Hentschel in 1923 regarded as the family Coppatiidæ, but with additions and subtractions. Since *Coppatias* is a synonym of *Jaspis*, that genus must be used as the basis for the family name. This group is characterized by having as microscleres only euasters, the megascleres being as in the subfamily above. Just as the Rhapidistiinæ with oxeas and streptasters may be compared to the Choanitidæ with tylostyles and streptasters, so the Jaspinæ with oxeas and euasters may be compared to the Timeinæ with tylostyles and euasters. Were tetraxon spicules added to the Rhapidistiinæ, the comparison would be to the family Ancorinidæ to be described below, and similarly with tetraxons added to Jaspinæ the comparison would be to the Stellettinæ to be described below. The subfamily Jaspinæ is represented in the West Indian regions by two species, one of which occurs at the Dry Tortugas.

NAJAX new genus

This is proposed for sponges having oxeas as the principal spicules, some of which may be centrotylote and some of which may appear to be styles by modification of one end of what was primarily an oxea. The microscleres are euasters, ordinarily oxyasters. The genotype is here designated as *Halicnemia duplex* Topsent (1927, p. 6). Another species referred here is *H. arbuscula* Topsent (1928, p. 185) and also the species to be described below.

Najax solida new species

Two specimens of this sponge were collected on July 1, 1927; one, the holotype, U. S. Nat. Mus. Cat. No. 22529, from the moat of Fort Jefferson and the other from a depth of 2 meters near Bird Key Reef.

They are subspherical masses; the color in life was black on the upper side and drab on the underside, with an endosome that was buffy. This has faded a little in alcohol. The consistency is compressible. The surface is superficially smooth, but microscopically some spicules are perceived to protrude a little. There is a cartilaginous cortex 2 to 3 mm. thick over the entire surface. The numerous subdermal canals interconnect freely to make a net-like pattern and are about 160μ in diameter. The oscules are situated at the bottoms of the depressions and have a total diameter of about 5 by 7 mm. The structure internally is cavernous, very obviously permeated by radiate fascicular tracts of spicules that are perpendicular to the surface and each about 100μ diameter. Just below the cortical crypts (or subdermal canals as described above) very numerous spicules occur in a zone where they are crowded together like felt. The megascleres are principally oxeas, but occasional styles occur. The size range is up to at least 20 by 1000μ, but numerous spicules are slightly smaller than this. The microscleres are uncommon; they are oxyasters of 8 to 12 rays, total diameter 13μ. A few are not so large, even as small as 6μ in diameter. These latter may or may not be regarded as a separate category; they are not sufficiently common to make it evident whether or not that should be the interpretation.

This species is very like *Halicnemia duplex*, chosen as the genotype, a sponge from the middle Atlantic Ocean, except that *duplex* frequently has centrotylote megascleres and has larger and more abundant oxyasters. It is very like *arbuscula*, mentioned above, except that the asters in that species have spiny rays; that also is an Atlantic species. An interesting specimen for comparison here is the one described as *Coppatias solidissima* Wilson (1902, p. 387), a West Indian sponge which resembles *solida* in the megascleres and in the color, but has in addition a few triaxon spicules. The microscleres, moreover, differ sharply in that they are dermal microxeas only 3 by 60μ. It is conceivable that the above-mentioned triaxon spicules were not proper or were mere accidental malformation, in which case this species should be referred to the new genus under consideration, but, on the other hand, they may be proper. The best that can be said is that *solidissima* is a species very difficult to allocate generically.

Scope of the Family

Other genera that should be referred to the subfamily Jaspinæ are as follows: *Adreus* Gray has megascleres that are frequently styles, and the microscleres have rays that are sometimes dichotomously branched. Its very thin ramose form should be stressed also. *Axos* Gray is very similar, even to the external form, except that some of the rays of the asters are even more branched than in *Adreus*, and oxeas are more common as megascleres. It may be that to differentiate between these two is an unjustifiably fine distinction, and that one should fall into synonymy to the other. They were established simultaneously. *Cryptotethya* Dendy has only oxeas as megascleres and has asters that are chiasters. On the basis of published descriptions it would appear that the species described by Burton and Rao in 1932 (p. 318) as *Amphius sollasi* should be transferred to this genus. *Epallax* Gray is typical of the subfamily, with only oxeas as principal spicules. There are two sorts of oxyasters; one sort with many rays, the other with very few rays. *Hemiasterella* Carter has usually styles as its principal spicules. The oxyasters are typical of the subfamily, and the vase-like shape should be stressed in order to differentiate from *Axos* or *Adreus*. *Jaspis* Gray has oxeas and only one sort of oxyasters. *Kalastrella* Kirkpatrick has oxeas for megascleres, spherasters and microtylostyles for microscleres. It is quite likely that the microtylostyles are spherasters having only one ray, which suggests comparison to the interesting genus *Microtylostylifer* in the Ophlitaspongiidæ. *Rhabdastrella* Thiele has oxeas and two sorts of asters, the one being a spheraster and the other an oxyaster. *Vibulinus* Gray has both oxeas and styles for principal spicules, and the asters are provided with a small centrum, so that they are much suggestive of spherasters. The external shape is in general like that of *Axos*.

Other names that need consideration in this connection include: *Astropeplus* Sollas is a synonym of *Jaspis*. *Echinospongia* Gray is a synonym of *Axos*. *Coppatias* Sollas is a synonym of *Jaspis*. *Diastra* Row is a synonym of *Rhabdastrella*. *Dorypleres* Sollas is a synonym of *Jaspis*.

SOLLASELLIDÆ Lendenfeld

This is here used for a small group of genera characterized by having only oxeas as spicules, no microscleres. The spiculation is like that of *Halichondria*, for instance, but the architecture, being radiate, is very different; instead it is comparable to that of the family Suberitidæ and the order Hadromerina, which has, however, tylostyles instead of oxeas. It may be closer compared to the Tetillidæ of the Choristida, which family has tetraxon spicules added to the oxeas. Sometimes the triaenes or other quadriradiate spicules are rare; were they not found, identification might be made with some epipolasid genus. Perhaps a species originally possessing tetraxon megascleres may lose them. On the other hand, perhaps a hadromerine sponge might have its spicules so altered that they no longer had the tylote modification. The result could closely resemble one of the Epipolasida. It is possible, of course, that the *Sollasellidæ* are polyphyletic in origin, but proof of this is lacking and the purpose of convenience would seem to be favored by retaining a separate group for these genera.

EPIPOLASIS new genus

This genus is here established for species with radiate architecture, having almost exclusively oxeas as spicules, and these frequently of enormous variation in size. They may perhaps be referable into two distinct categories, a larger and a smaller one. The type is proposed as *Spongosorites suluensis* Wilson (1925, p. 331). Five other species referred to the genus *Spongosorites* by Dendy also should be transferred here. They are as follows: *lamella* (1905, p. 184); *lapidiformis* (1905, p. 185); *novæzealandiæ* (1924, p. 307); *salomonensis* (1921, p. 125); and *topsenti* (1905, p. 182). Another species of this new genus is that to be described below.

Epipolasis angulospiculata (Carter) new combination

Two specimens of this sort were dredged on June 26, 1932, from a depth of 70 meters, southeast of Loggerhead Key.

The shape is massive, about 4 by 7 cm. The ectosome was slaty, almost black in life, but the endosome was yellowish drab. These colors have not faded greatly in alcohol. The consistency is cartilaginous, very dense, almost stony. The surface is fundamentally smooth, but much roughened by foreign matter. Microscopically it is minutely hispid. The ectomosal specialization seems to consist only of a concentration at that region of cells with dark pigmentation. It is difficult to assign a thickness to this layer, because it tapers gradually into the interior of the sponge, but it is definitely under 1 mm. thick. Each of the specimens has about half a dozen oscules, 3 to 4 mm. in diameter, with a slightly elevated collar around each. The pores appear to be closed, as they are not in evidence. The spicules are radiately arranged, some projecting considerably beyond the surface. They are so abundant that the soft parts must conform to the interstices left by them. Little aggregation into fascicular tracts is evident. The spicules are of very great variety and size, but two size ranges seem evident. One sort has a diameter of 5 to 9μ, often 6μ, the other has a diameter of 30 to 40μ. There are some intermediates. The spicules of smaller diameter are practically always oxeas, and range from about 500 to 600μ in length. The larger spicules are usually over 1000μ in length, up to at least 1320μ. They are often strongyloxeote at one end and sharply pointed at the other. Some are completely strongyloxeote, and a very few are typical oxeas. The general fusiform shape is constant, the variation being confined exclusively to the very tips of the spicules.

Suberites angulospiculata, described by Carter (1879, p. 346), is obviously conspecific with the form under discussion, although Carter makes no mention of the strongylote form of any of the spicules. The shape, structure, surface, etc., is very similar, except that Carter does not record oscules. His was from the West

Indian region which confirms the identification. That other description which appears most like that of *angulospiculata* is *Spongosorites salomonensis* of Dendy (1921, p. 125), an Indian Ocean specimen. This seems more like the Dry Tortugas specimen than does Carter's original description, but, although no decided point of difference can be pointed out on the basis of published description, it is by no means certain that Dendy's species is conspecific with the West Indian. Were it so, however, it must be noted that Carter's name has priority.

Scope of the Family

The various genera to be referred to the family Sollasellidæ do not differ sharply from each other. *Aponastra* Topsent has two size ranges of oxeas, some of which are centrotylote, and some of the dermal spicules are tangentially arranged. *Astromimus* Lendenfeld is not well known; apparently there was only one size range of oxeas which were radiately arranged. *Axinomimus* is hereby proposed as a new genus to have as genotype *Axinella paradoxa* Ridley and Dendy (1886, p. 482). The spicules are oxeas only; the construction is so nearly radiate that inclusion in this family seems to be justified, but it deviates from typical members of the family in the direction of the family Axinellidæ inasmuch as the spicules are more or less vaguely arranged in plumose tracts. The rubbery consistency is very noteworthy. *Axinyssa* Lendenfeld has oxeas only and very conulose surface. This is represented in the West Indian region by that species which was described first as *Agelas albolutea* by Duchassaing and Michelotti (1864, p. 77). The species described as *Axinella pumila* by Keller (1889, p. 397) should be transferred into this genus. This is not *Axinella pumila* of Babić (1921 p. 83), for which another name will therefore be necessary. Three species originally described as of the genus *Acanthella* should be transferred here. They include *ehrenbergi* Keller (1889, p. 395), *flabelliformis* Keller (1889, p. 394), and *multriformis* Vosmaer (1885, p. 25). *Sarcomella* Schmidt is not well known; his description emphasized resemblance to a jelly-fish in external form. As far as we know there were only radiate long oxeas, but other forms may have been present and not described. *Sollasella* Lendenfeld also has the radiate structure of the group of which it is typical and has diactinal spicules only, but many of these are strongyles instead of merely being oxeas.

TETHYIDÆ Gray

This family is not well separated from the others in the order Epipolasida. The megascleres are often diactinal, slightly modified in the direction of being monactinal by more or less blunt terminations at one end. Even more commonly there is a bluntly rounded shape at each end, suggestive of the strongyle shape but more nearly pointed at one end than at the other. If equi-ended such would be termed strongyloxeas. When they have one end tylote, they are clearly monactinal. The microscleres are euasters of two or more sorts, one or more smaller varieties and a larger one that is a spheraster. The Tethyidæ are only with great difficulty to be described as separate from the subfamily Jaspinæ on the basis of spiculation, but recourse may be had satisfactorily to the external form, and particularly to the very warty surface. The ectosomal pedunculate tubercles frequently present doubtless possess taxonomic significance, plausibly physiological (reproductive). Specimens of this family are also frequently more or less stipitate, and there is therefore considerable indication of relationship to the Podospongiidæ. The endosome is strongly radiate, and the ectosome usually is a cortex. One further justification for continuing the use of this family is that it has been employed so frequently and for such a long period of time.

TETHYA Lamarck

This, almost the only genus of the family, has the characteristics thereof as already described. It is represented from the West Indian region at least by the species to be described below.

The following generic names fall into synonymy to *Tethya: Alemo* Wright, *Amniscos* Gray, *Donatia* Nardo, *Lyncuria* Nardo, *Tethea* Bowerbank, *Tethyum* Lieberkühn.

Tethya seychellensis (Wright) Wilson

The one specimen was collected June 30, 1932, from the underside of a mass of dead coral on Bush Key Reef, where barely underwater at low tide.

It is small for this species, being a subhemispherical mass only about 1 cm. in diameter. The color in life was lemon yellow; in alcohol it is nearly white. The consistency is stiff, only slightly compressible. The surface is in the form of low hillocks, each about 1 mm. in diameter and about a third as high. The cortex is slightly over 1 mm. thick, dense and tough. Neither pores nor oscules are to be made out. The endosome is emphatically radiate in structure, the megascleres pointing toward the surface from a focal point which is located near the center of the base. The megascleres are typically strongyloxeas, of which one end is much more nearly pointed than the other. The smaller ones appear as though they were simple oxeas; intermediate forms connect them with the larger sort. Typical sizes are 13 by 960μ, 5 by 730μ and 2 by 540μ, the larger sizes being the commoner. The microscleres may be divided into three categories. There are large spherasters 62μ in average diameter, of which the centrum is about half. There are oxyasters about 9 to 10μ, and asters about 7 to 9μ, having a centrum 2μ in diameter and the rays microspined. The oxyasters without the centrum have the rays perhaps faintly microspined also, so that these two smaller sorts are not perfectly separated from each other.

This species was first described as *Alemo seychellensis* by Wright (1881, p. 13), and was recorded from the West Indies also by Wilson (1902, p. 388). It may or may not be conspecific with the other species of *Tethya* recorded from the West Indies, namely, *T. diploderma* Schmidt (1870, p. 52). It is to be separated from the many very closely related species of the genus *Tethya* on the basis of minute details in the microscleres.

Scope of the Family

There are sponges externally somewhat tuberculate like *Tethya*, but not quite typically so, internally with microscleres like those of *Tethya*, but megascleres verging toward the tylostylote. The resemblance to *Timea* is important to notice. Are such curious intermediates, encountered every now and then among sponges, to be regarded as hybrids? Due to lack of breeding records we do not know. For the abovementioned sponges I propose the generic name *Tethytimea*, the genotype to be *Donatia tylota* Hentschel (1912, p. 317). This probably should be called *repens*, because Burton (1924, p. 1036) argues that it is a synonym of *Tethya repens* Schmidt (1870, p. 51), a West Indian species. Schmidt's description, however, is very unsatisfactory, and the synonymy is not certain. Other species that should be transferred here include *Tethya corticata* Lendenfeld (1888, p. 48), *Tethea maza* Selenka (1879, p. 472), *Donatia multifida* Carter (1882, p. 358), and *D. stelligrandis* Dendy (1916, p. 266). *Tethycordyla* de Laubenfels has the spiculation of *Tethya*, but the habitus varies in the direction of that of *Stylocordyla.* The type, *T. thyris* de Laubenfels (1934, p. 8) is West Indian.

PODOSPONGIIDÆ new family

This new name is required because *Podospongia* was proposed by du Bocage in 1864, four years before Wyville Thomson established *Stylocordyla,* thus making it advisable to supplant the name Stylocordylidæ Topsent.

The spiculation of this family consists of strongyloxeas with some variations, accompanied, in the case of the type genus, by spiny microscleres. The structure is in some respects more or less radiate to plumose, as in the tetraxon sponges, and also as in the family Axinellidæ. The elaborate symmetrical architecture is the most characteristic feature of this family. In spite of the fact that on paper there appears to be some evidence of relationship to the Choristida and to the Axinellidæ, study of actual specimens and careful comparison between spicules of the one and spicules of the other give clear-cut indication of more significant relationship to the genus *Tethya.* The columns of spicules in the Podospongiidæ and in the Tethyidæ radiate from a central point within the sponge mass instead of from a point on the base, as in the axinellid and tetraxonid sponges, which therefore may become encrusting. Neither *Tethya* nor *Podospongia* shows much tendency to spread laterally, and the latter is even more conspicuously stipitate than is the former. The family Podospongiidæ occurs typically in the deeper parts of the ocean; it is not well represented in the West Indian region.

Scope of the Family

Oxycordyla Topsent has sharper pointed spicules, more typically oxeote than those of *Stylocordyla. Podospongia* du Bocage is entirely typical of the family, it has diacts with rather variable ends, but typically strongyloxeote. The spines on the microrhabds are arranged in more or less symmetrical whorls, much as in the genus *Latrunculia* of the Choanitidæ, and might perhaps be termed discorhabds, although they are not provided with genuine discs as in the genus *Didiscus* of the family Phorbasidæ. *Stylocordyla* Wyville Thomson is very much like *Podospongia,* even to the architecture, but it seems to lack the microscleres entirely.

Lovenia du Bocage is a synonym of *Podospongia* and *Microcordyla* Zirpolo is a synonym of *Stylocordyla* as is also *Stylorhiza* Schmdit.

SCLERITODERMIDÆ Sollas

This is a family of lithistid sponges characterized primarily by desmas, but also by diactinal megascleres that verge toward the strongylote or strongyloxeote, and therefore perhaps are closely related to *Tethya.* In the cases of those (and there are several) that have typical oxeas in addition to desmas, the relationship may instead be to the Sollasellidæ or Jaspidæ. In the case of lithistid species, it is very clear that they are derived from other forms not having such malformed spicules, but it is not always easy to be certain from which family they were derived.

Of this family *Azorica* Carter has oxeas and desmas. *Microscleriderma* Kirkpatrick has the same spiculation with the addition of small contort strongyles. *Scleritoderma* Schmidt has the oxeas and desmas and in addition small straight strongyles and curved oxeas that resemble sigmas; in fact, they may possibly be such. Of this species, the genotype, *S. paccardi* Schmidt (1879, p. 28), is a West Indian form. *Seliscothon* Zittel has only oxeas and desmas and is especially differentiated from other related genera by the erect lamellate form. *Setidium* Schmidt is very like the above but has a cup-shaped form. *Tretolophus* Sollas has both oxeas and styles in addition to the desmas.

CHORISTIDA Sollas

This order contains those families which may be described as typically tetraxonid, that is to say, containing spicules that protrude from a central point to four directions or axes. Tetracts are also found in the order Carnosa to be described below, but to a lesser extent than in the orders already considered. As in the preceding order, the Choristida are radiate in structure, frequently having a pronounced or conspicuous cortex. The principal spicules are never tylostyles, as in the Hadromerina, but are frequently oxeas as in the Epipolasida. Unlike the situation found in the Carnosa, there are never short-shafted triænes, but long-shafted protriænes and anatriænes are thoroughly typical. It is highly probable that both these two types of spicules (the protriæne and the anatriæne), should be regarded as a proper component of every species of every genus in the order. It is true that an occasional specimen is found in which one or the other or both of these is rare, or even apparently wanting, but when more specimens of the species are available and careful search is made they are always, or nearly always, to be found. More or less thicker ortho- or plagiotriænes, with or without the dichotomous modification may properly be used to some extent for diagnostic purposes. Here, however, as in the two preceding orders, the customary procedure for separating families is on the basis of the microscleres present. It is traditional, for example, to systematize on the basis of whether there are streptasters, euasters, or none. The first family is Ancorinidæ, which has euasters and streptasters, therefore corresponding to the Jaspidæ of the Epipolasida and the Choanitidæ of the Hadromerina. The second family is Tetillidæ, with no microscleres at all, therefore corresponding to the Sollasellidæ of the Epipolasida and the Suberitidæ of the Hadromerina. The third family is Geodiidæ, which has very peculiar modifications of the euasters as is also true of the Placospongidæ of the Hadromerina and somewhat similarly of the Tethyidæ of the Epipolasida. The fourth family is Craniellidæ, in which the microscleres are sigmoid. Dendy in his later works (*e.g.* the *Sealark* reports) regarded the Craniellidæ as closer to the Pœcilosclerina than to the Ancorinidæ, all the sponges with sigmas being in his Sigmatotetraxonida. The ectosomes and endosomes, in fact practically every item from top to bottom and outside to inside, agree as between Craniellidæ and Ancorinidæ but differ between these and the Pœcilosclerina. The latter have in common with the Craniellidæ only those items that are true of the Demispongiæ in general, and the sigmas. Microscleres have taxonomic value (but much less than do megascleres and general structure) and among them the sigmas have nearly the least of all. Sigmas are almost certainly derived from various sources, perhaps being greatly simplified chelas in some cases, in others merely modified spirasters. That this is the derivation in the Craniellidæ is shown by the fact that the sigmas of this family are not sharp pointed as are those of the Pœcilosclerina, but are blunt. They are furthermore somewhat roughened. The last family of the order is the lithistid one, Kaliapsidæ.

ANCORINIDÆ Gray

The genera of this family have the radiate, often corticate architecture of the Choristida, of course with the anatriænes and protriænes as megascleres. Plagiotriænes are common. The microscleres always include asters. The group is divided here in two subfamilies. The Ancorininæ have streptasters, with or without euasters, thus corresponding to the Rhaphidistiinæ of the Jaspidæ and the Choanitinæ of the Choanitidæ, similarly set off by their streptasters. The other subfamily of the Ancorinidæ, the Stellettinæ, has only euasters, corresponding thus to the Timeinæ of the Choanitidæ, and the Jaspinæ of the Jaspidæ. It should be remarked that it has regularly been the custom to regard this group not as merely a subfamily, but as a division of full family rank. If such basis is significant of so great a taxonomical separation, surely the Desmacidonidæ, even as used in the very restricted sense employed in this article, might be subdivided into a score or more families!

We have for consideration the family Theneidæ Sollas, which has been used also by many subsequent authors. *Thenea* Gray differs from *Ancorina* Schmidt only in that the streptasters of the latter are much less bent than those of the former. Each has streptasters, euasters, anatriænes and probably protriænes, dicho-plagotriænes, subradiate structure with densely hispid surface. The very symmetrical habitus of some specimens of *Thenea* reflects the circumstance that those specimens grew in the stable environment of relatively very deep ocean. *Thenea* Gray probably can be maintained as a separate genus from the earlier *Ancorina* Schmidt, but only by the slimmest of margins. Where then is there any justification for a separate family for *Thenea*?

The Ancorininæ will be considered first. Although sponges of this subfamily are rather common in the West Indies, there seems to be no representative of them near the Dry Tortugas.

Scope of the Subfamily

Ancorella Lendenfeld almost certainly belongs here, but is not typical of the group in general, inasmuch as the microscleres which are here interpreted as being essentially streptasters, are actually devoid of any spines at all, and therefore appear as though merely microxeas. *Ancorina* Schmidt has not only streptasters but two distinct sorts of euasters. The genotype should be understood as being *A. cerebrum* Schmidt (1862, p. 51). There are two West Indian species each described by Schmidt in 1870. They are *sigmophora* (p. 67) and *pachastrelloides* (p. 68). There is also *A. fenimorea* de Laubenfels (1934, p. 3) from Puerto Rico. *Characella* Sollas has two sorts of microscleres, one is an unusual sort that resembles two euasters connected with each other, but it is probably to be interpreted as a sort of streptaster. *Disyringa* Sollas has euasters and peculiar streptasters, but is chiefly noteworthy for its very symmetrical and peculiar external form. There is one conspicuous inhalent tube leading to the spherical main body and another very conspicuous exhalent tube leading from it. In this it resembles *Tethyopsis*, *Tribrachion* and *Monosyringa*. *Ecionemia* Bowerbank has in addition to the typical megascleres, euasters that are spherasters and microscleres that vary from typical spiny streptasters to practically smooth oxeote rhabds. *Hezekia* de Laubenfels has as microscleres only spiny microrhabds. The one species, *H. demera* de Laubenfels (1934, p. 4), is West Indian. *Kapnesolenia* de Laubenfels also lacks euasters, having as microscleres only spiny microrhabds; its external form is remarkable, being globular with an enormous siphon as in *Monosyringa*, *Tethyopsis* and *Tribrachion*. The one species, *K. fisheri* de Laubenfels (1934, p. 6), is West Indian. *Neothenea* de Laubenfels has as microscleres metasters and bent microrhabds that may be reduced asters. Its one species, *N. enæ* de Laubenfels (1934, p. 5) is West Indian. *Papyrula* Schmidt, like *Ancorella*, has only smooth microscleres. In fact it may be differentiated only on the basis of minute differences in the megasclere spiculation, which may be deemed insignificant; in this latter eventuality *Ancorella* (being later) would fall in synonymy to Schmidt's genus. *Penares* Gray has euasters of commonplace form together with smooth diactinal microscleres. *Penares* is represented in the West Indian region by the species which Schmidt (1880, p. 70) described as *Stelletta mastoidea.* *Rhabdodragma* Dendy has for microscleres spiny euasters, spiny microrhabds and others that are smooth. *Sanidastrella* Topsent is very like the above, except for the lack of smooth rhaphides. *Scutastra* Ferrer Hernández would appear by the description to be very like the genus *Penares* but may possibly be differentiated on the basis of the peculiar type of aster present. This is an euaster with exceedingly numerous rays. With it are commonplace smooth diactinal microscleres. *Seiriola* Hanitsch is a very dubious genus, the possibility existing that it represents a single description of two associated separate species. *Stryphnus* Gray has microscleres of the peculiar sort mentioned above for *Characella,* but in addition to them possesses streptasters of the ordinary sort, and euasters. *Tethyopsis* Stewart has both euasters and smooth microrhabds, but is set apart chiefly for its peculiar external form. The main body is globular, with a long (presumably exhalent) tube, in which respect it may be compared to *Tribrachion, Kapnesolenia,* and *Monosyringa. Thenea* Gray, like *Ancorina,* has both streptasters and euasters, but may be differentiated in type for its more or less symmetrical external shape, but even more so because the streptasters are spirasters instead of being straight. *Tribrachion* Weltner also has the streptasters with the spiral modification. There are furthermore euasters present and the above-mentioned peculiar external form as described for *Tethyopsis.* *Yodomia* Lebwohl has smooth diactinal microscleres, streptasters and spirasters.

Among names that are to be considered in this connection but that are synonyms of other genera, the following are synonyms of *Thenea: Clavellomorpha* Hansen, *Dorvillia* Saville Kent, *Tisiphonia* Schmidt, and *Wyvillethomsonia* Wright. The following are synonyms of *Ecionemia: Psammastra* Sollas and *Thalassomora* Lendenfeld.

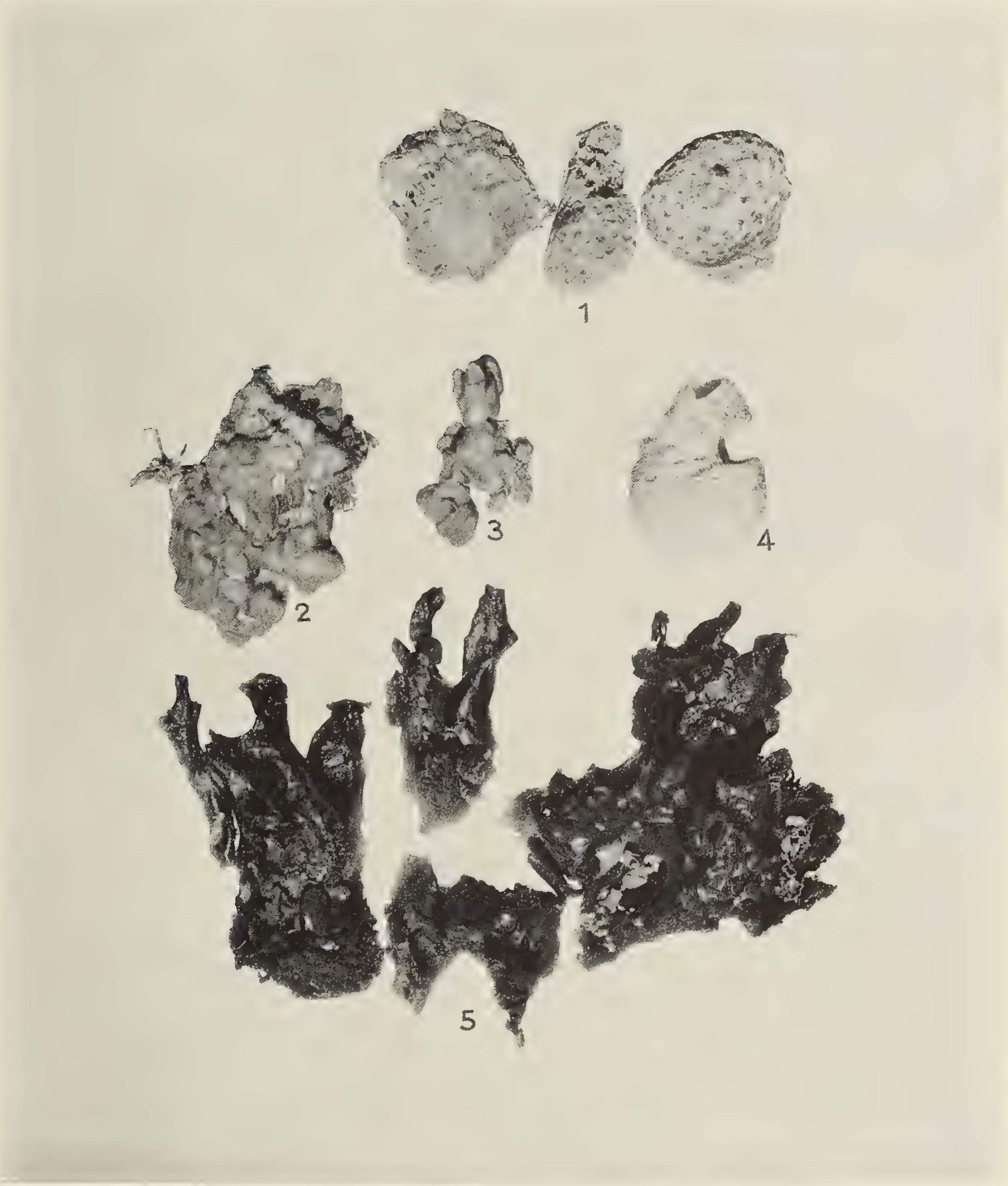
STELLETTINÆ Sollas

This is usually regarded as a separate family, but it is separated from the Ancorininæ only by the lack of the streptasters. While I agree that this indicates a need for some separation, it does not seem to me to warrant maintaining a separate family. In addition to the reasons cited above, there is probability that many genera of the Stellettinæ are more closely related to genera in the Ancorininæ than they are to other genera in their own subfamily. As an example may be mentioned *Monosyringa* of the Stellettinæ, which by its peculiar external form shows very close relationship to *Kapnesolenia, Tethyopsis* and *Tribrachion* of the Ancorininæ.

This subfamily is represented by at least one species in the vicinity of the Dry Tortugas.

MYRIASTRA Sollas

This genus in the original description was also referred to by the name *Myriaster,* but the spelling *Myriastra* was first mentioned and has most frequently been used subsequently. The megascleres are triænes and large oxeas, much as in the genus *Stelletta,* as is also the radiate architecture; practically the only difference is that only one sort of euaster is present instead of two. There is frequently a conspicuous cortex, but this may be lost from individuals of species in which it is normally present, so that it would seem not to have any great value as a generic diagnostic. The genus would seem to be well separated from *Stelletta* if the presence



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Trachygellius cinachyra*, three specimens. Figures 2 and 3, *Myriastra kallitetilla*, two specimens. Figure 4, *Leuconia barbata*. Cloacal opening shows at smaller (upper) end. Rectangular aperture at right shows where a section was cut out so that microscopical preparations might be made. Figure 5, *Pellina carbonaria*, four specimens.

or absence of types of asters has even a fraction of the value ascribed to such items in connection with the establishment of the former family Theneidæ.

The genotype of *Myriastra* needs to be understood as being *M. subtilis* Sollas (1886, p. 188). In addition to the Dry Tortugas specimen described below there are at least three other descriptions of sponges that belong in this genus, each, however, originally placed in another. These new transfers include: *Ancorina fibrosa* Schmidt (1870, p. 67), *Pilochrota tenuispicula* Sollas (1886, p. 190), and *Pilochrota variabilis* Wilson (1902, p. 384). *Stelletta tethopsis* of Carter (1880, p. 137) was transferred into *Myriastra* by Lendenfeld in 1903, but it is properly a *Stelletta* and should be returned to the original genus.

Myriastra debilis, originally described by Thiele, 1900, p. 25, from the East Indies, is recorded by Uliczka 1929 p. 49 from the West Indies, as variety *stenospiculata.*

Myriastra kallitetilla new species

Plate 18, fig. 2.

This specimen, the holotype, U. S. Nat. Mus. Cat. No. 22466, was found in the moat of Fort Jefferson on June 28, 1932, just below low-tide mark.

It is a massive growth about 2 cm. high and 4 cm. in width. The shape is much like a cauliflower, being much given over to subspherical surface protrusions, each about 5 to 9 mm. in diameter. The ectosome was brilliantly colored, almost as brightly as fire, a beautiful orange. In places this tended toward a bright vermillion, in others toward a gaudy yellow. Even after being in alcohol for several weeks the color is still present although not quite so vividly as in life. The endosome in life was, and in preservative still is, a very pale drab. The consistency is compressible and elastic but firm. The surface in alcohol appears lipostomous. The ectosomal specialization is first that the majority of the cladomes of the tetraxon spicules occur there, and second that it is crowded to a depth of 400μ with cells containing deep orange inclusions. The endosome is packed with long megascleres arranged perpendicularly to the surface, therefore to be described as indicating radiate architecture. Here and there among them canals ascend also perpendicularly to the surface, each canal about 400μ from its nearest neighbor and 150 to 200μ in diameter. The pores and oscules or both probably occurred at the distal extremities of these ascending canals, and it may be assumed that such openings have been closed by protoplasmic activity. The openings were probably about 175μ in diameter. In life the surface was plainly speckled, probably by these pores and oscules afterward closed, and so not visible in the alcoholic specimen. The rarity of the oxeas is remarkable. Throughout the order Choristida they are frequently one of the most common megascleres. In this particular species they are difficult to find; they are present, however, and are frequently 12 by 666μ. The abundant spicules are the anatriænes and protriænes in practically equal abundance, and indiscriminately mixed among each other. The cladomes are always toward the surface and very often are immediately at it. The common diameter of the chords of the cladomes for both anatriænes and protriænes is 30 to 45μ, but the protriænes are occasionally found much larger, up to at least 57μ. The rhabds of the anatriænes are often 9 or 10μ by about 600μ. Those of the protriænes, 11 or 12μ by 675μ. A small anatriæne was found, a chord 25μ, rhabd only 5 by 270μ. The microscleres are astonishingly rare. They are tylasters, usually 8 to 9 or 10μ in total diameter, having about 8 rays in all and no evident centrum. I found one as large as 16μ total diameter, otherwise much like the others; but this could scarcely be regarded as a second category of microscleres.

This species is rather sharply set off from all others in the genus by the peculiar cauliflower-like lobed structure. The microscleres are very commonplace, but their rarity is not frequently noticed in other species; the great abundance of the anatriænes and protriænes is also noteworthy, as is the beautiful external color.

Scope of the Subfamily

Other genera of the subfamily Stellettinæ include the following: *Aurora* Sollas has microscleres of two sorts, euasters and spherasters. *Monosyringa* Brøndsted has two types of euasters and very peculiar external form characterized by a conspicuous (presumably exhalent) tube of great size. *Stelletta* Schmidt differs from *Myriastra* (described above) in that there are always present two distinct categories of euasters as microscleres. Uliczka (1929, p. 46) describes a new species, *Stelletta incrustata*, from the West Indies (St. Thomas). This should be transferred to *Myriastra.*

Pilochrota Sollas is a synonym of *Myriastra*; of it the genotype should be understood as being *P. haeckeli* Sollas (1886, p. 189). There are no less than five synonyms of *Stelletta*, as follows: *Anthastra* Sollas, of which the genotype needs to be understood as being *Anthastra communis* Sollas (1886, p. 191), *Astrella* Sollas, *Collingsia* Gray, of which the genotype needs to be understood as being *Tethea collingsii* Bowerbank (1866, p. 87), *Dragmastra* Sollas and finally *Pumex* Gray.

TETILLIDÆ Sollas

The family is here understood to include the typical genus *Tetilla*, which is ordinarily misunderstood. The type of *Tetilla* is a species without any microscleres whatever. The bulk of those species commonly referred to *Tetilla* and the genera ordinarily referred to Tetillidæ belong instead in a new family to be described below under the name of Craniellidæ. The forms left in the Tetillidæ as here understood may possibly be related to Craniellidæ by loss of the peculiar microscleres of that group, but it is equally possible that each and every one of them may be derived instead by loss of microscleres from such sponges as *Stelletta* or *Ancorina.* A very striking proof of the danger of the ordinary assumption in regard to the former group Tetillidæ was brought forcibly to my attention in regard to the species *Myriastra kallitetilla.* Before having microscopic preparations revealing the microscleres I was confident it was one of the so-called Tetillidæ (properly Craniellidæ). The megascleres and general architecture were strongly suggestive of species such as have been regularly identified as *Tetilla.* Had the microscleres been wanting, it would of course have been proper *Tetilla.* To my utter astonishment, when they were found, they proved that the species was a Stellettid!

As is characteristic of all the Choristid families, this also is usually radiate in architecture with anatriænes, protiænes, and long thin oxeas for spicules. Corticate ectisomes are common.

Scope of the Family

Cantabrina Ferrer-Hernández differs markedly from other tetraxonid genera in its approach to the architecture of the Axinellidæ. The basically radiate plan is protracted vertically until a plumose plan is evident. Were its tetraxon spicules lacking, it could scarcely be differentiated from the genus *Homaxinella.* The genotype, *C. erecta* Ferrer Hernández (1914, p. 453), moreover, is very poorly provided with triænes. It has anatriænes but lacks protriænes. The genus may properly be diagnosed as having both sorts, however, in view of the situation discussed below in regard to *Ectyonilla.*

Craniellopsis Topsent is puzzling. Its genotype needs to be established as *Tethya zetlandica* Carter (1872, p. 417). There is no conspicuous difference between this and *Tetilla,* but the separation of the oxeas into two size categories, smaller ones abundant in the ectosome and larger ones confined to the endosome, may give validity to the genus.

Ectyonilla Ferrer-Hernández differs from *Cantabrina* only in the possession of protriænes in addition to anatriænes. The two agree otherwise in spiculation and in the very peculiar body structure. They are clearly so closely related that it is here advocated that *Ectyonilla* be dropped in synonymy to *Cantabrina.*

Tetilla Schmidt has as its genotype *euplocamos* Schmidt (1868, p. 40), a form without microscleres, and should have transferred into it all of those numerous species at present in the so-called genus *Tethyopsilla.* It should leave to *Craniella* practically all of the many species that are now placed in *Tetilla,* but would retain the genotype and also the following four: *Tetilla mutabilis* deLaubenfels (1930, p. 26), *Tetilla radiata* Selenka (1879, p. 468), *Spiretta raphidophora* Lendenfeld (1888, p. 43), *Tetilla violacea* Kieschnick (1898, p. 15). *Tetilla* is probably represented from the West Indian region by two very inadequately and probably unrecognizably described species, each established by Schmidt in 1870 (p. 67). The first was named *Craniella lens* and the second *Craniella insidiosa.*

There are four generic names that are clearly synonyms of *Tetilla*; they are: *Polyurella* Gray; *Psetalia* Gray; *Spiretta* Lendenfeld, of which the genotype needs to be established as being *S. raphidophora* Lendenfeld (1888, p. 43) and *Tethyopsilla* Lendenfeld.

GEODIIDÆ Gray

This family is in many other respects very like the Ancorinidæ or the Tetillidæ, but is remarkable for the possession of a distinct armor that is packed with peculiar microscleres of a sort known as sterrasters. These are presumably modified spherasters with enormous numbers of very blunt or stellate ended rays, so that the mature spicule ceases to resemble an aster (as it does during its formation) and comes to resemble a tuberculate egg.

Because of these elaborate spherasters, the Geodiidæ may be compared to the Placospongiidæ of the order Hadromerina, and to a significant but lesser extent to the Tethyidæ of the Epipolasida.

The family is represented from the vicinity of the Dry Tortugas by at least the following genus and species.

GEODIA Lamarck

This genus, as is typical of the family, has euasters, spherasters, sterrasters and in general all the types of megascleres characteristic of the order Choristida. In the literature descriptive of West Indian sponges we find the following species referred to the genus *Geodia,* all of which are probably synonyms of *G. gibberosa,* which is described below: the species first described as *Isops pachydermata* by Sollas (1886, p. 198), *Geodia tuberculosa* Bowerbank (1872, p. 626), *G. media* Bowerbank (1873, p. 13), *G. reticulata* Bowerbank (1874, p. 300), *G. caribœa* Duchassaing and Michelotti (1864, p. 105), *G. cumulus* Schmidt (1870, p. 71), and possibly *G. thomsoni*

Schmidt (1870, p. 70). The latter may be a separate species. Furthermore Lendenfeld (1903, p. 113) reports that the species of *Geodia* originally described as *Cydonium mülleri* by Fleming (1828, p. 515) had been found also in the West Indian region, but the specimens referred to by Lendenfeld probably also belong, not to *mülleri*, but to *gibberosa*. Uliczka (1929, p. 58) records a specimen from the West Indies as being *Geodia exigua* Thiele. It is possible that his identification may be correct. *Exigua* was described, 1898, p. 11, from the North Pacific.

Geodia gibberosa Lamarck

This species occurs in the moat of Fort Jefferson, representative specimens being collected for study on July 6, 1927, and June 20, 1932. In general the description below applies chiefly to the last mentioned of these.

It is rather an amorphous mass about 5 by 7 cm. in diameter. The surface is irregularly lumpy, but essentially smooth. The color in life was drab. The consistency is rather elastic, with a hard yet flexible cortex. This cortex is easily detachable and is pierced by very numerous openings 50 to 100μ in diameter. There is one large opening 3 mm. in diameter; it might conceivably have been caused accidentally, in which case the oscules must be as minute as the pores. There are places where there occur very small openings, say 15μ only, but their real nature is obscure; that is to say, they may have been pores, or openings in oscular sieves, and they may even not have been proper at all, but merely caused by accidents in treating the material. The endosome is in general rather cavernous, with a few radiately or perpendicularly disposed fascicular tracts, composed of eight rows each of spicules, the total diameter being slightly over 100μ. The ectosome is 600 to 1300μ thick, and as usual in this family is densely packed with sterrasters. Their measurements range from 42 to 54μ, partly from variation in spicule mass and partly from being oval rather than spherical, so that they present different aspects to view as observed with the microscope. The endosomal spicules are chiefly oxeas arranged as noted above. They reach a size of at least 30 by 1215μ, and are often as large as 28 by 1134μ. In a few instances somewhat smaller ones are found. Near the cortex are a few plagiotriænes, their cladomes immediately under the sterraster layer as though supporting it. They typically have a chord diameter of 182μ, rhabd diameter of 20μ and length of 810μ. The endosomal microscleres include the so-called developmental forms of the spherasters which are smaller and with sharp points so that they are essentially spherasters with very large centrums. Their dimensions range about 36 to 47μ. There are a few oxyasters, rays perhaps slightly roughened, total diameter about 28 to 30μ. There are very abundant small spherasters with centrums 2 to 3μ in diameter, from which the rays project only 1μ farther, so that the total diameter is 4 to 5μ. Sometimes the rays are scarcely perceptible, whereupon the spicules seem merely to be siliceous spherules.

There appear to be greater differences between individual specimens of a given species of the genus *Geodia* than between the descriptions of the different species. That form in the literature which would appear to be most closely related to the one under discussion is described by Wilson (1902, p. 386), where he identifies it with *Caminus sphæroconia* Sollas (1886, p. 196). The specimen studied at the Dry Tortugas on July 6, 1927, differs so completely from the typical in the direction of that described by Wilson that it might also have been identified with *sphæroconia*. The possibility is very strong that the two species should be regarded as synonymous, in which case the latter would fall, of course, to *Geodia gibberosa*

Lamarck (1815, p. 334). *C. sphæroconia* was described by Sollas from the South Atlantic. The above-mentioned specimen which Wilson identified as being conspecific is a West Indian sponge. Uliczka 1929 p. 52 records a West Indian species as *Caminus sphæroconia* which is evidently conspecific with the others discussed immediately above.

Scope of the Family

Caminus Schmidt differs from typical *Geodia* only in the possession of microscleres described as spheres. In *Geodia gibberosa* as described above, it is noteworthy that the smaller spherasters frequently have rays so short that they can scarcely be found, and a slight further reduction thereof would produce the type of microsclere diagnostic of *Caminus. Erylus* Gray is a very different sort of sponge entirely, with the sterrasters derived in a different way from peculiar disc-shaped beginnings. Even when fully developed they are much more disc-shaped than are those in *Geodia. E. alleni* de Laubenfels (1934, p. 7) is West Indian. *Geodinella* Gray superficially appears difficult to allocate because it possesses what seem to be tylostyles, which are, however, deformed tetraxon spicules. This is evident because they often show rudiments of clads at the swollen end, and a few are clearly triænes with short clads. In portions of the sponge that fail to show the tetraxon spicules, there is superficial agreement with the genus *Placospongia* which is described above under the order Hadromerina. Confusion may be avoided by the fact that the general architecture of *Geodinella* is like that of *Geodia* and not at all that of distinctive pore grooves and polygonal surface pattern as found in *Placospongia. Pachymatisma* Bowerbank is separated from *Geodia* by the addition to the other microscleres of streptasters. The species described as *Caminus apiarium* by Schmidt (1870, p. 71) is a West Indian form that would seem properly referable to *Pachymatisma. Amphitrema* Wright is a synonym of *Pachymatisma,* and *Triate* Gray is a synonym of *Erylus.* There are also the following generic names for consideration in connection with the family Geodiadæ, all of which are (or at least appear to be) synonyms of *Geodia* itself. These include: *Caminella* Lendenfeld; *Cydonium* Fleming; *Isops* Sollas; *Kalops* Sollas; *Pyxites* Schmidt; *Sidonops* Sollas; of which the genotype needs to be understood as being *S. neptuni* Sollas (1886, p. 196); the very inadequately known *Stellogeodia* of Czerniavsky, and finally *Synops* Vosmaer. Uliczka (1929, p. 54) describes a West Indian sponge as *Sidonops stromatodes* new species. It is very much like *Geodia gibberosa,* except for the oscular arrangement, but for the present I hesitate to drop it in synonymy.

CRANIELLIDÆ new family

This family answers in general to the characteristics frequently ascribed to the Tetillidæ. There are radiate oxeas and tetraxonid megascleres, usually anatriænes and protriænes. There is frequently a cortex. The microscleres are perhaps to be regarded as streptasters, but they are pronouncedly C-shaped or spiral. At first they seem smooth like the sigmas of the Pœcilosclerina, but with ends more blunt. Use of the oil immersion lens, in at least some cases, reveals a roughened surface that very probably proves them to be reduced spirasters with spines only vestigial.

This family occurs in the West Indian region, and is represented in the vicinity of the Dry Tortugas by the species *Cinachyra allocladia* Uliczka.

CINACHYRA Sollas

Cinochyra Sollas was later respelled by him *Cinachyra* and this latter may be regarded as a justifiable correction of an earlier lapsus. It is characterized by very peculiar pore openings in special concavities. There is a sponge of this general nature in the West Indies, which also has the peculiar double-ended protriænes characteristic of *Amphitethya,* and I propose for it the generic designation *Uliczka,* the genotype and only species being *Cinochyra schistospiculosa* Uliczka (1929, p. 45). This later author has also described several West Indian species of *Cinachyra,* namely, *allocladia* (1929, p. 41), *apion* (1929, p. 43), *kukenthali* (1929, p. 44), *rhizophyta* (1929, p. 38). Burton (1934, p. 523) stated as his opinion that all of these species are synonymous with *Cinachyra australiensis* Carter (1886, p. 127) because they have the same range of variation, but judging from my experience with species of this genus that I have studied in the field and those which I have studied in the collections of the U. S. National Museum from other portions of the West Indies, I regard it as highly probable that Uliczka was justified in separating these into different forms. The synonymy to the Australian form while admittedly possible, is nevertheless doubtful.

Cinachyra allocladia Uliczka

This species is represented from the Dry Tortugas by U. S. National Museum No. 22437.

Two specimens of this sponge were dredged June 26, 1932, southeast of Loggerhead Key in 70 meters of water. The following description applies to the larger of the two specimens.

This is a subspherical mass 2.5 cm. in greatest diameter. In life it was yellow, in alcohol this has faded and is dull, but is still in evidence. The consistency is elastic to cartilaginous. On the surface are smooth areas, varying from considerably under 1 mm. up to more than 1 cm. in diameter. Around them are areas with projecting spicules which often protrude as much as 2.5 mm. from the surface of the sponge. There are also on the surface four elevated regions each having a shallow central concavity surrounded by a palisade nearly 2 mm. high, which is made of projecting spicules. These concavities are punctiform, being studded with pits each somewhat under 0.3 mm. in diameter; they are probably to be regarded as specialized pore areas. In addition to these inhalent regions, there are three rather commonplace oscules, each approximately 1.5 mm. in diameter. The internal structure is radiate, having some spicules strewn in confusion among others that spread out from a central focus.

Probably the most abundant single sort of spicule is the anatriæne; those of this variety seem to be confined to the spicule plush which projects from the surface of the sponge. Each has a rhabd diameter of only 1 to 3µ, averaging about 2µ, and the length runs well over 1 mm. The cladome has the usual shape and a chord diameter of about 75µ. Another very abundant sort of spicule is a large oxea; those of this sort radiate throughout the sponge mass, and often also project far beyond the surface. Their diameter is frequently about 32µ, but some are as large as 40µ, and others as small as less than 24µ. Their length can only be estimated, because those that were longest were always broken in sampling, but I should estimate at least 4 mm., and am sure that some exceed 3 mm. There are occasional protriænes, with rhabds about the size of those of the anatriænes, but with clads only about 15µ long, and rhabd diameter rather less than that. The most distinctive spicule of all is one with a rhabd the size of the oxeas, or a little smaller—say up to 32μ. There are two or three clads at the surface of the sponge, these are amazingly bent. It is not uncommon to find as many as six moderately sharp bends per clad, although some have only one such bend. They resemble horns of some species of African antelope, such as the "Kudu." There are sigmaspires with strongylote to tylote ends, having a chord length often only about 7μ, total length (as if straightened out) perhaps 10μ.

This species was described in 1929, p. 41, from the Dry Tortugas by Emil Uliczka, in the Zoologische Jahrbücher, and this is presumably the second record for the species. It differs only very slightly from numerous other species of *Cinachyra.*

Scope of the Family

Amphitethya Lendenfeld has in addition to the typical spiculation some peculiar megascleres that are apparently rhabds with protriæne cladomes at each end. *Chrotella* Sollas, of which the genotype needs to be understood as being *C. macellata* Sollas (1886, p. 181) differs from *Craniella* in having two distinct size ranges of sigmospirasters. *C. amphiacantha* Topsent (1904, p. 96) and *C. ibis* Row (1911, p. 311) should be transferred to *Craniella,* and *C. minuta* Wilson (1902, p. 383) should be transferred to *Tetilla.*

Craniella Schmidt should be understood as possessing for its genotype *Craniella tethyoides* Schmidt (1870, p. 66), a West Indian form. Other West Indian species of this genus were described as *Tethya oscari* by Lendenfeld (1903, p. 25) and *Ancorina sigmatophora* by Schmidt (1870, p. 67). *Craniella* has the radiate plan, with oxeas, triænes and sigmas typical of the family. *Fangophilina* Schmidt may be a synonym of *Cinachyra* mentioned above. Its genotype should be established as *Tethya radiata* Selenka (1879, p. 468). *Paratetilla* Dendy is very difficult to allocate as to the proper family. There are small spicules present, each possessing approximately four actines radiating from a central point. If these are calthrops, the genus probably should be referred to the order Carnosa, to be described below. On the other hand, they may merely represent a form of simplified euaster, in which case the family is Craniellidæ, but at least the genus is exceedingly distinctive as compared to others in the family under consideration. The genotype should be understood as being *Tethya merguensis* Carter (1883, p. 366). *Raphidotethya* Burton has two sizes of the sigmoid microscleres in addition to microrhabds and apparently, to judge from the published descriptions, lacks the tetraxon spicules. It is therefore placed in this family with considerable hesitation and chiefly upon the basis of my surmise that such was its real relationship in view of its architecture. *Spongocardium* Kirkpatrick is sharply set off from others in this family by its possession of very peculiarly shaped sigmoid microscleres. A West Indian form which should be regarded as belonging to this genus was described as *Fangophilina submersa* by Schmidt (1880, p. 73). A new genus *Kaira* is hereby proposed for species having the body plan and megascleres of the other Craniellidæ, and the peculiar sigmoid microscleres, to which are added streptasters or straight spiny microhabds. The genotype is proposed as the species described by Lendenfeld (1907, p. 98) as *Tethya hebes,* and to *Kaira* should also be transferred the species described by Carter (1886, p. 127) as *Tethya australiensis.*

KALIAPSIDÆ new family

This family is here established for a group of genera that possess lithistid spicules, but, judging from the other spicules present and the general architecture, are closely related to the families described above as constituting the order Choristida.

The following genera are included: *Brachiaster* Wilson has practically no spicules other than the desmas and dichotriænes, and therefore its family location is exceedingly difficult; it is put here by surmise only. *Callipelta* Sollas has very peculiar microscleres each resembling two tylasters connected together. *Corallistes* Schmidt has desmas, oxeas, dichotriænes and spirasters; the genotype should be understood as being *Corallistes typus* Schmidt (1870, p. 22), a West Indian species. *Coscinospongia* Bowerbank has in addition to the desmas dichotriænes with peculiarly twisted rhabds. *Costifer* Wilson has oxeas, plagiotriænes and monocrepid desmas. *Discodermia* Bocage has desmas, oxeas and discotriænes for megascleres; for microcleres there are streptasters and smooth microstrongyles. It is represented as in the West Indian region by *dissoluta* Schmidt (1880, p. 87). *Kaliapsis* Bowerbank, an earlier genus, is very like the above except for the lack of the smooth microstrongyles. *Lepidothenea* new name is hereby proposed for *Lepidospongida* of Dendy, because that name proves to be preoccupied. There are few if any desmas, but the phyllotriænes present instead of dichotriænes are very characteristic of the lithistid sponges only, so location here is obvious. *Lophacanthus* Hentschel has only anatriænes and desmas. Of *Macandrewia* Gray there are two West Indian species, that described as *Discodermia amphiaster* by Schmidt (1879, p. 23) and that described as *Corallistes clavatella* by Schmidt (1870, p. 23). The genus is for sponges with desmas, phyllotriænes and microxeas. *Neopelta* Schmidt should have as its genotype *N. perfecta* Schmidt (1880, p. 88). This genus is for sponges with desmas, discotriænes, microxeas and streptasters. *N. imperfecta* Schmidt (1880, p. 88) is a West Indian species. *Neosiphonia* Sollas has a very peculiar spiculation including amphitriænes.

Pleroma Sollas is typical of the family; it has desmas, dichotriænes, microxeas and streptasters. *Pomelia* Zittel is primarily a fossil genus. The characteristics upon which palæontologists are compelled to base their diagnoses are not always satisfactory for recent species. A West Indian sponge, however, is identified as of this genus by Zittel in 1877, the description without the name being on page 62 and the name only on plate 1, figure 4. This, *P. schmidti*, like many specimens of lithistid sponges, had desmas only. As such, it fits *Pomelia's* diagnosis of separate vertical tubes in the interior, radial canals simple, and summit arched. Now are we to assume that there is a genus of lithistid sponges with only desmas, to be called *Pomelia* and to receive such perhaps macerated specimens? Or shall we assume that such have merely lost their characteristic spicules and are therefore unrecognizable? I presume the latter to be advisable. *Rhacodiscula* Zittel should have as genotype *R. asteroides* Zittel (1878, p. 151). In addition to the megascleres, which include phyllotriænes, oxeas and desmas, there are both euasters and streptasters. The type is West Indian. *Rimella* Schmidt lacks the euasters and has strongyles instead of oxeas. Its type *R. clava* Schmidt (1879, p. 21) is West Indian. *Siphonidiella* Burton has only dichotriænes in addition to the desmas, but these latter are of different sorts in the ectosome as compared to the endosome. *Theonella* Gray has the usual desmas, has phyllotriænes and microstrongyles.

Other generic names which need to be considered in this connection include the following: *Collectella* Schmidt is probably a synonym of *Theonella; C. arita* Schmidt (1879, p. 379), the genotype, is West Indian. *Collinella* Schmidt is a synonym of *Discodermia*; its type, *C. inscripta* Schmidt (1879, p. 21) is West Indian. *Jereopsis* Schmidt was a preoccupied name, unrecognizably described and not provided with species. *Lepidospongia* Dendy, being preoccupied, is above replaced by the new name *Lepidothenea.*

CARNOSA Carter

This order, like the preceding, is provided for sponges that are typical tetraxonid forms. They have astrose microscleres as do both the Choristida and Hadromerina. Somewhat like the first of these other two orders, though to a smaller extent, they possess the corticate ectosome and radiate architecture. The latter item is very little in evidence, however, because of the lack of long spicules. A very few of them also possess the long-shafted triænes that are characteristic of the Choristida, but the typical tetraxon megasclere in this order is that known as the calthrops. This is a spicule having four actines, each of approximately the same length as that of the other three. From the fact that three of these four rays are occasionally dichotomously branched, thus recalling the dichotriænes of the Choristida, one may assume that in most instances the calthrops is arrived at by reduction in length of the rhabd of the typical triæne. It is by no means certain that this is the only derivation, however, for it may well be that some calthrops are asters that have lost by reduction all except four of the previously numerous rays. For this reason there are grounds for thinking that the group as here considered may be polyphyletic, but if so, the forms from which it has been derived can not have been exceedingly diverse. It may be regarded as being a satisfactorily characterized order, but for the question as to the advisability of separating the Carnosa from the Choristida. The existence of genera such as *Pœcillastra* of the Plakinastrellidæ gives one pause. This genus is in general typical of the Carnosa, but has conspicuous long-shafted triænes also, as do several related genera. So many intermediate forms exist among the Porifera, however, that to amalgamate all so connected would leave inconveniently few categories, consequently it is here advocated that Carter be followed to the extent of using his order, Carnosa.

This group has been widely recognized. Sollas, in monographing the sponges of the *Challenger* collection (see 1888, p. 274), termed it Microsclerophora, but used it for only the genera with very small spicules, *i.e.* omitting *Pœcillastra* from it. *Pœcillastra* is here placed in the family Plakinastrellidæ on the basis of redescriptions of *Plakinastrella* Schulze. Minchin (1900, p. 147) put the latter genus in the Microsclerophora, which, however, he regarded properly as only a suborder of Carter's earlier Carnosa. Dendy (1905, p. 64) proposed to alter Microsclerophora to Homosclerophora because he thought the latter a more properly descriptive term, but Carnosa has priority, is inclusive to the extent here advocated, and is therefore to be retained.

HALINIDÆ de Laubenfels

This was established by de Laubenfels (1934, p. 1) to replace Pachastrellidæ Hentschel, because *Halina* Bowerbank is not only an older genus than *Pachastrella* Schmidt, but is also more thoroughly typical of the family it represents. It should be noted that the use of *Halina* by Gray (about 1830) was a nomen nudem, not affecting the latter use of the name by Bowerbank. This family exemplifies to the fullest extent the characteristics of its order, in that its genera have no long-shafted triænes at all; they have only the calthrops and diactinal spicules for megascleres, and astrose microscleres. It is here proposed to divide the Halinidæ into two subfamilies on the basis of the nature of these microscleres. The principal subfamily, the Halininæ, is for those having streptasters and a subfamily Corticiinæ exists for those having euasters. The Halininæ then, of course, are to the Corticiinæ as the Ancorininæ are to the Stellettinæ, and as the Rhaphidistiinæ are to the Jaspinæ, and as the Choanitinæ are to the Timeinæ. In each of these pairs of subfamilies the first mentioned is for genera with streptasters, the second for genera with only eausters. The subfamily Halininæ is represented from the West Indies by the genus *Roosa,* found near the Dry Tortugas; also see remarks under *Pachastrella.*

ROOSA de Laubenfels

This genus has as its genotype and only species the species *zyggompha.* This is a compact fleshy sponge having only very small spicules and these usually several times bent at just about the middle. A few that are not bent are oxeas, the others are probably all to be regarded as reduced tetraxon spicules, since a very few of them have, instead of the lumpy twist at the middle, one or dubiously two reduced actines or rays. Since the spicules are all short, there is no conspicuous radiate plan. *Roosa* was established (1934, p. 2) for a specimen of *zyggompha* from Puerto Rico.

Roosa zyggompha de Laubenfels

Plate 19, fig. 2.

The principal specimen, U. S. Nat. Mus. Cat. No. 22490, was found on the underside of a stone on Bush Key Reef on June 30, 1932; it was so located as to be barely under water at low tide. Two additional specimens were collected on July 31, 1932, from the same general locality but at a depth of about 2 meters. The holotype is U. S. Nat. Mus. Cat. No. 22277 from Puerto Rico.

This species is massive, frequently about 10 mm. by 17 mm. in outside dimensions. In life it was a very rich brown color; in alcohol it has faded only a little. One of the two specimens collected July 31, however, is merely encrusting, 3 mm. thick, and this one was gray. The consistency is firm, slightly compressible, rather like cork. The surface is smooth and has only microscopic openings in it. There is no conspicuous dermal specialization. At the surface there occur abundant openings 30 to 40µ in diameter, but mostly very close to 32µ. The first specimen collected had no evident oscules, but both of those collected on July 31 had each just one oscule not quite 1 mm. in diameter, located on the point at the convex surface farthest from the point of attachment in the case of the subspherical specimen and not quite at the center of the encrustation. It is dubious whether there could be said to exist a special dermis. Some 20µ thickness at the surface is slightly different from the underlying structure. The endosome is very dense; it has some canals about 100µ in diameter, but is chiefly a mass of chambers 30 to 40µ in diameter, with the spicules crowded as best they may in the sheets of flesh between the chambers. Some sections give the misleading appearance as of very crooked spicular tracts, approximately 18µ thick. These are properly to be interpreted as mere sections of wall-like structures containing confused masses of spicules. The spicules bear considerable resemblance to those of calcareous sponges, but upon testing with acids proved to be siliceous. There are some triaxons, say 1 to 2 per cent of the total number of spicules. These are usually decidedly sagittal and alate like the capital letter T with a very long cross-piece. There are also occasional triaxons that are nearly equiangular and equiactinal. The vast majority of the spicules seem to have lost the upright part of the T entirely, but it is commemorated by a twist with one or more knots at the center of the transverse piece. The common spicule size is 2 by 50µ. The largest that I found was 2 by 56µ, and there are a very few as small as only 1 by 27µ. I found one at least as small as 0.5 by 16µ. This latter, however, is scarcely to be regarded as a microsclere, but almost certainly is a developmental form.

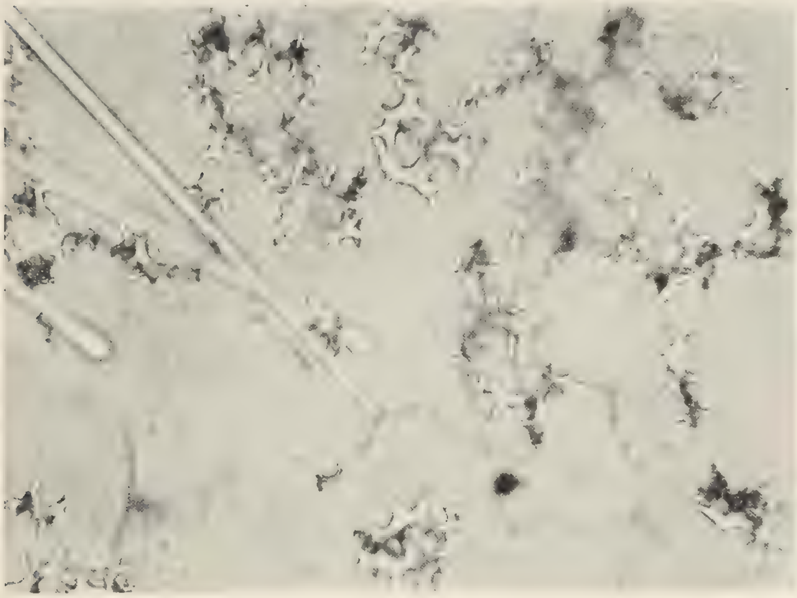


Fig. 1

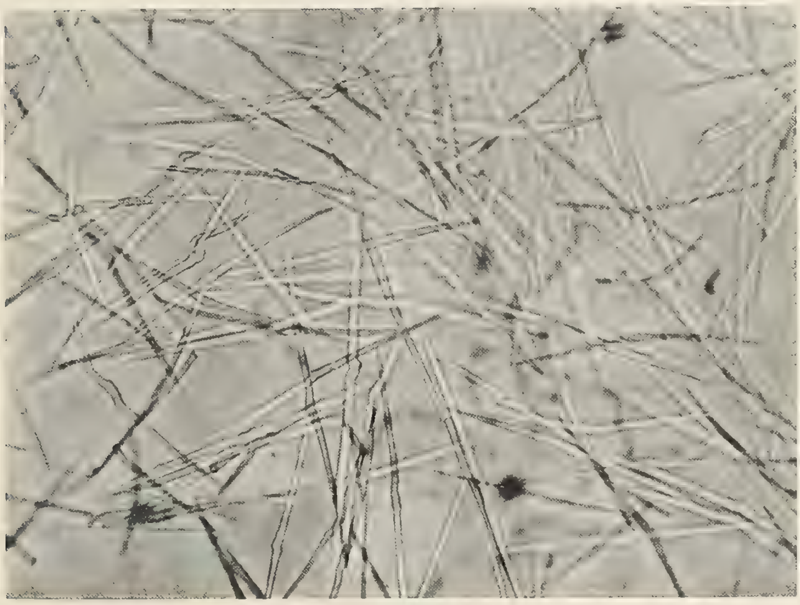


Fig. 2

Photomicrographs of isolated spicules, x 80. Figure 1, *Spirastrella coccinea.* Ends of a few tylostyles appear at left. There are abundant spirasters, showing range of variation. Figure 2, *Roosa zyggompha,* representative spicules, strewn at random.

It occasionally happens as an accidental modification of an obviously diactinal spicule that the form resembles somewhat those that are characteristic of the genus under discussion. Such spicules are, however, rare, even if found at all, and yet make up the principal spiculation of *Roosa.* It seems clear that the other species most closely related here is that described as *Plakoritis simplex* by Schulze (1880, p. 430). This is a Mediterranean form, since also recorded from the Australian region. It is encrusting, has oxeas and triactinal spicules frequently alate, and apparently very few of these show any extensive alteration or deformation. *Roosa* might conceivably be derived from such a sponge.

Scope of the Subfamily

In addition to *Roosa,* the subfamily Halininæ contains several other genera. In discussing them it may be assumed, unless mentioned to the contrary, that the megascleres consist of oxeas and calthrops.

In *Dercitancorina* Topsent, some of the calthrops have the dichotomous-modification, and the microscleres are straight streptasters. In *Dercitopsis* Dendy the microscleres are centrotylote, or oxeas so bent as to make it appear that they are asters which have lost all except two of the previously many rays. One may note their resemblance to the spicules of *Roosa. Plakinastrella trunculifer* Topsent (1927, p. 4) should be transferred to *Dercitopsis.* This genus is represented from the West Indian region in the vicinity of the Dry Tortugas, by a form described as *Plakinastrella onkodes* by Uliczka (1929, p. 60). *Halina* Bowerbank, the type of the family, has its calthrops occasionally provided with the dicho-modification, its streptasters are straight, and there are dubiously proper toxas, at least frequently present. The genotype is *Halina bucklandi* Bowerbank (1858, p. 288). *Halinastra* new genus is here established to have as its genotype *Pachastrella exostotica* Schmidt (1868, p. 16) to which genus also should be transferred *Pachastrella cribrum* Lebwohl (1914, p. 78). This genus is particularly hard to classify with respect to the two subfamilies here proposed because it savors of each, having both euasters and straight streptasters. The megascleres are quite typical of the family in general, being oxeas and calthrops only. If the bent centrotylote microscleres of *Dercitopsis* and *Nethea* are also to be regarded as reduced euasters, they, like the genus now under consideration, would also constitute forms intermediate between the two subfamilies. *Monotria* new genus is here established to have as its genotype *Coppatias solidissima* Wilson (1902, p. 387), a West Indian sponge. It is characterized by very simple spiculation of oxeas and triods which are quite plausibly to be regarded as calthrops that have lost one of the four rays. In *Nethea* Sollas the dichotomous-modification is present, there are spirasters as microscleres and also others that are to be regarded as euasters that have lost all except two of the primitive rays, resembling *Dercitopsis* in this respect. It is very difficult to differentiate between this and the earlier genus *Pachastrella* Schmidt, which, however, apparently seldom has the dicho-modification to the calthrops. The type of the genus, *Pachastrella monilifera* Schmidt (1868, p. 15), has been recorded from West Indian waters, and also *P. dilifera* de Laubenfels (1934, p. 1) is West Indian. *Pachataxa* new genus is here proposed to have as genotype *Pachastrella lithistina* of Schmidt (1880, p. 68), a West Indian species. Apparently the megasclere spiculation consisted almost exclusively of calthrops and the microscleres were ataxasters. Topsent (1923, p. 6, Bulletin d l'Inst. Ocean. No. 435) regarded this as merely a modification of *Pachastrella monilifera,* but whereas this may possibly be the case, the printed evidence is so far to the contrary that it does not seem advisable to assume so at present. Lendenfeld in 1903 (p. 82) transferred it to the genus *Dercitus.* It appears to me to be so radically different from other forms that, as stated above, I propose for it a new genus. Another genus that is clearly Halinidæ, but difficult to place as between the Halininæ and Plakinastrellinæ, is *Plakortis* Schulze. Apparently it has no microscleres whatsover. The megascleres include diactinal and triactinal spicules, the latter sometimes sagittal or alate, doubtless to be regarded as reduced calthrops. *Sphincterella,* new generic designation, is hereby proposed to supplant *Sphinctrella* Schmidt because this name was preoccupied by Schmarda in 1870 for a protozoan. Against this it may be cited that Schmidt's genus, also established in 1870, may possibly have had the priority over Schmarda's, but this is very dubious, and in order to avoid confusion it were better to establish the new name. The genotype is to be regarded as *Sphinctrella horrida* of Schmidt (1870, p. 65). The sponge described as *Pachastrella japonica* by Thiele (1898, p. 19) should be transferred into this genus. The megascleres comprise two sizes of oxeas together with triods, and in addition there are small lumpy microxeas, small lumpy calthrops, and various peculiarities as to architecture.

Other names which need to be considered in this connection include the following: *Battersbyia* Bowerbank is a synonym of *Halina,* as is also *Dercitus* of Gray. *Pachamphilla* Ledenfeld is a synonym of *Dercitopsis. Picraster* Sollas is a synonym of *Pachastrella. Placinastrella* Topsent is a synonym of *Dercitopsis*; this should not be confused with the similarly sounding but differently spelled *Plakinastrella* of Schulze, an earlier and valid genus. *Sphinctrella* of Schmidt, as noted above, is here replaced by *Sphincterella. Stœba* of Sollas is a synonymy of *Halina. Triptolemus* of Sollas is a synonym of *Pachasterella.*

CORTICIINÆ Vosmaer

As noted above, this subfamily is separated from the Halininæ for its possession as microscleres of only euasters, no streptasters. The megascleres also show a pronounced tendency to be tuberculate or almost acanthose, with an exaggeration of the dicho- or tricho-modification very common. There is a notable lack of any very large spicules, any over 200µ long being unusual.

SAMUS Gray

This genus is so peculiar in its spiculation that it might be advisable to establish for it a separate family as was done by Sollas (1887, p. 423). The megascleres comprise lumpy amphitriænes and lumpy sigmoid spicules. Microscleres seem to be missing unless all the spicules are microscleres. The sponge frequently lives in the burrows of *Cliona* and has been suspected of boring itself. Its genotype, *Samus anonyma* Gray (1867, p. 526), is a West Indian species and probably occurs near the Dry Tortugas.

Samus anonyma Gray

This species is always so small that it is difficult to give any extended description of its characteristics other than that its texture is somewhat spongy and its color probably drab.

On June 22, 1932, from a depth of 17 meters just east of Loggerhead Key was brought up a group of specimens including some sponge tissues among which I found, probably as a foreign inclusion, one of the very peculiar spicules of the genus *Samus.* This was almost certainly of the species *anonyma* which has been recorded from the West Indian region. This spicule was one of the partially spined trichoamphitriænes, 150µ in greatest length.

Samus anonyma was described by Gray in 1867 (p. 526). It presumably has no close relatives. The only other specific name left in the genus until the present time is *Samus parasiticus* of Carter (1880, p. 60), which is very poorly known. *Samus complicatus* of Carter has been by various authors transferred to *Plakina* or to *Corticium*, and *Samus simplex* of Carter has been similarly transferred either to *Dercitus* (*Halina*), or *Stœba.*

Scope of the Subfamily

The following genera may be placed in the Corticiinæ: *Astroplakina* Dendy has in addition to calthrops also oxeas and euasters, some of which are smooth and others spined. The sponge which Uliczka 1929 p. 50 described as *Pachastrissa hartmeyeri*, a West Indian species, probably should be regarded as an *Astroplakina.* It differs from the type of that genus in that none of its asters are spiny. *Calthropella* Sollas has, in addition to calthrops, triods and bent diacts. The microscleres are typically spherasters, but the rays thereof may be exceedingly small or even completely wanting, so that the spicule is merely a smooth siliceous sphere. *Corticella* Sollas has only calthrops and spiny euasters. *Corticium* Schmidt has in addition to the calthrops curiously modified derivatives thereof having many tuberculate branches at the end of the rhabdome and some spines at the ends of each of the three clads. *Placinolopha* Topsent has calthrops, triacts and oxeas, and in addition has spicules which may possibly be regarded as modified calthrops with the rays branched triply or even quadruply at the ends. *Plakina* Schmidt has some of the calthrops with the dicho-modification, has oxeas and has smaller spicules which may be regarded as modified calthrops with four or three branches at one, two, three, or at all four ends. *Thrombus* Sollas has in addition to the proper calthrops, smaller ones with some of the rays much branched at the ends and all lumpy.

Two other names that need consideration in this connection are *Orthorachis* Sollas and *Rhachella* Sollas, each of which should be regarded as unrecognizable, being based entirely on a single spicule.

PLAKINASTRELLIDÆ new family

This family is here established for those of the Carnosa which differ from typical members in having long-shafted triænes, such as for example anatriænes and protriænes, added to the typical principal spiculation of calthrops. All the genera are therefore intermediate between the orders Choristida and Carnosa. Having the calthrops, they are here put in the latter. The Plakinastrellidæ do not appear to be represented in the West Indian region.

Scope of the Family

The following genera are here regarded as representative of the Plakinastrellidæ: *Calcabrina* Sollas has some but not all of the calthrops with the dichotomous modification, and has long-shafted plagiotriænes in addition; its microscleres are streptasters. *Chelotropæna* Lendenfeld has in addition to typical calthrops, long-shafted dichotriænes and two sorts of microscleres, streptasters and microxeas. *Chelotropella* Lendenfeld has in addition to calthrops, both protriænes and anatriænes; the microscleres are euasters. *Pachastrissa* Lendenfeld has triacts which are to be regarded as modified calthrops together with long-shafted dichotriaenes and spherasters. Uliczka (1929, p. 50) describes from the West Indies a new species as *Pachastrissa hartmeyeri* which should, however, be transferred to *Astroplakina.*

Plakinastrella Schulze also has triacts and in addition possesses oxeas, long-shafted orthotriænes, microxeas and centrotylote, centrally bent oxeas that may be much reduced euasters. *Pœcillastra* Sollas has calthrops, oxeas and long-shafted orthotriænes; its microscleres are spirasters and microxeas. The genotype must be taken, to begin with, as being the sponge described as *Normania crassa* by Bowerbank (1869, p. 328), because that is the genotype of *Normania* and *Pœcillastra* has been established to take the place of *Normania.* The species name can not stand, however, because Sollas (1888, p. 98) has shown that this is a synonym of the sponge originally described as *Ecionema compressa* by Bowerbank (1866, p. 55). The genotype therefore becomes *Pœcillastra compressa.* *Vulcanella* Sollas has a spiculation very much like that of *Pœcillastra,* except that in addition to the other sorts there are present twice-bent strongyles which, however, are not certainly proper. If, as Sollas himself surmised, they are foreign, even in spite of the fact that the spiculation is very like that of *Pœcillastra* the two genera are not necessarily synonymous. Perhaps *Vulcanella* has instead greater relationship to *Sphincterella,* mentioned above, because of similarities in the architecture, particularly with respect to the apertures at the surface.

Another name which needs to be considered in this connection is *Normania* Bowerbank, which is a synonym of *Pœcillastra.*

CHONDRILLIDÆ Gray

The spiculation in this family consists exclusively of astrose microscleres and its systematic relationship would be very dubious indeed were it not for the fact that the soft parts bear very close relationship and resemblance to those of the other kinds of Carnosa, particularly the subfamily Corticiinæ. While of course the Chondrillidæ may be the more primitive and the others derived from them by additions, it is plausible to assume that they have been arrived at by reduction and loss of megascleres from ancestors that we may assume to have been like the Corticiidæ. In the absence of harder skeletal structure such as spicules, the rigidity of the sponges included in this family is arrived at chiefly by means of organic colloidal substances, perhaps to be described as jelly-like. Such structures, of course, are abundantly present in many other forms, particularly in other members of the order Carnosa. A considerable mass is arrived at, the Chondrillidæ by no means remaining thinly encrusting as do the Oscarellidæ.

The family does not now seem to be represented in the vicinity of the Dry Tortugas.

Scope of the Family

Up to the present time there seems to be one valid genus described in this order, namely *Chondrilla* Schmidt, whose microscleres are euasters, usually spherasters. Of this the genotype, *Chondrilla nucula* Schmidt (1862, p. 39), is a West Indian species, being recorded from the vicinity of Puerto Rico by Wilson (1902, p. 386). A new genus *Chondrillina* is here established to have as its genotype *Chondrilla phyllodes* Schmidt (1870, p. 26), another West Indian species. It is distinguished very emphatically from the typical genus by possessing spirasters or curved streptasters; it also has euasters like those in *Chondrilla.*

Two other names which need consideration in connection with this family are *Chondrillastra* Topsent, of which the genotype needs to be understood as being *Chondrilla australensis* Carter (1873, p. 23) and *Magog* Sollas, both of which are synonyms of *Chondrilla.*

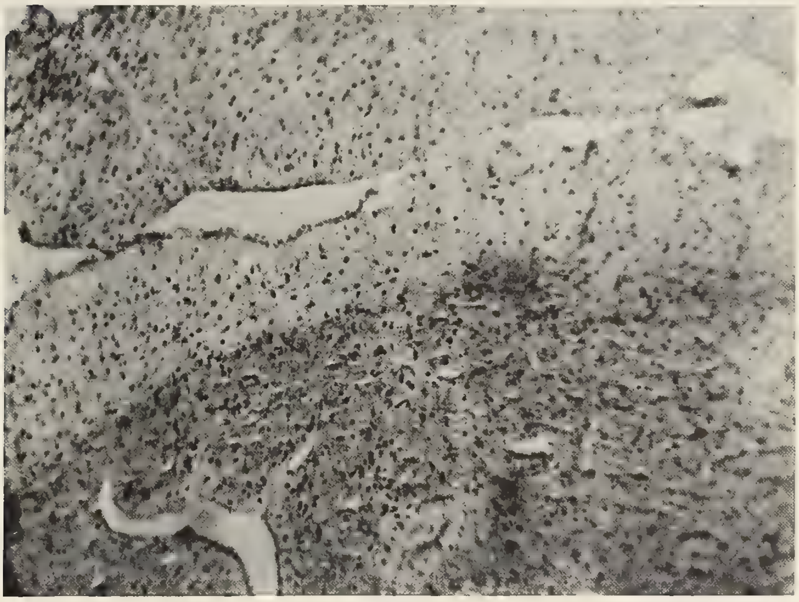


FIG. 1

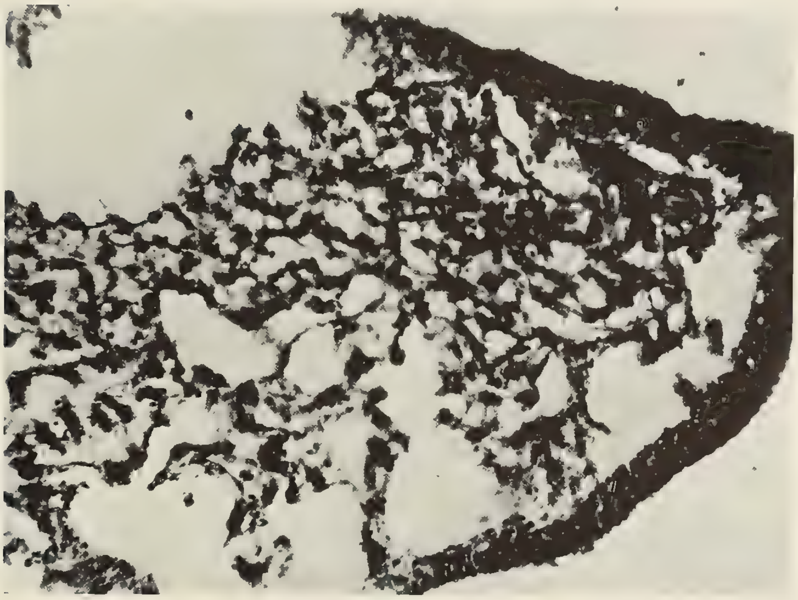


FIG. 2

Photomicrographs of sections of sponges. Figure 1, *Chondrosia collectrix*, x 80. Note scattering of cells in a profusely abundant colloidal ground-substance, permeated by few canals. Figure 2, *Holopsamma helwigi*, x 20. Note dense ectosome, with numerous canals in it perpendicular to the surface; also cavernous endosome.

CHONDROSIIDÆ Schulze

The sponges belonging to this family are very remarkable in that they possess absolutely no mineral or fibrous skeleton whatever, having only a mesoglœa or jelly for stiffening purposes, as in the Chondrillidæ. Their resemblance to the latter family is very great indeed, and it can scarcely be doubted that they have been derived from such ancestors by still further reduction in spiculation, even the microscleres also being lost. They may further be compared to the Oscarellidæ, which have even less of a skeleton, lacking as they do the stiff jelly. It is conceivable that the Oscarellidæ have been derived from Chondrosiidæ by extreme reduction, but there is much less evidence to this effect than exists to indicate relationship between *Chondrosia* and *Chondrilla.* As noted above, the Oscarellidæ are here placed near the Haplosclerina from which also they may have been derived by loss of fibers.

The Chondrosiidæ are represented in the vicinity of the Dry Tortugas by the following species.

CHONDROSIA Nardo

This genus, which is the only valid one in the family, has the characteristics noted above in the description of the family. It receives in synonymy, as has been noted by numerous other authors, *Cellulophana* Schmidt and *Gummina* Schmidt. It is represented from the West Indian region by at least the following species.

Chondrosia collectrix [Schmidt] new combination

Pate 20, fig. 1.

This species is very abundant in shallow water in the vicinity of the Dry Tortugas, especially near the reefs east of Bird Key and in the moat of Fort Jefferson. It grows where it may be practically out of water at low tides, but when located so near low-tide mark that it is in danger of exposure it is usually so placed that wave action will keep it moist. By actual observation with a thermometer I have found water temperatures at the immediate location of specimens of this species to be slightly over 38° C. and I state it as my confident opinion that temperatures close to or even over 40° are sometimes reached in such locations. The sponge grows very often on dead specimens of the corals *Porites* and *Acropora.*

This is a massive, often subspherical species, always rounded and sometimes being in the form of an association of several rounded lumps. The surface is smooth and glistening, usually drab in color, but sometimes nearly black, particularly when much exposed to sunshine. There may be an olive shade appearing here and there. The interior is always drab, according to my observation. The consistency is very much like that of cartilage or somewhat softer; it may be sliced very easily. The ectosome is marked by greater toughness than that of the interior, and by a preponderance of the pigmented cells. It is about 250µ thick, but tapers off indefinitely below. The oscules are usually a little under 2 mm. in diameter. The pores close readily, but may open to about 100µ in diameter. In this species the colloidal jelly is present, as is usual in sponges, but here it permeates the entire body and is condensed to so great a stiffness that it replaces all the other skeletal structures. There are no fibers nor spicules. The mesoglœa is eroded by meandering canals of varying sizes and by the numerous small, spherical, diplodal, flagellate chambers, which in my material are 20 to 27µ in diameter.

As noted above, the closest relationship here is quite clearly to *Chondrilla.* In the field the identification is more puzzling in regard to members of other animal Phyla and even occasionally to certain forms of algæ. For instance there are

Ascidians of the Phylum Chordata (therefore exceedingly distant from the sponges phylogenetically) which often bear so great a resemblance superficially to *Chondrosia* that without dissection it is difficult to tell which is which. The Ascidian of the sort in question in the vicinity of the Dry Tortugas is *Phallusia nigra.*

The sponge under discussion was first described as *Cellulophana collectrix* by Schmidt (1870, p. 25) from the vicinity of the Dry Tortugas. Lendenfeld (1888, p. 74) described an Australian sponge as *Chondrosia collectrix* new species; it differs from *collectrix* of Schmidt in that it incorporates relatively enormous quantities of foreign material. The species name being preoccupied, I propose for *collectrix* of Lendenfeld the new name *chucalla.*

DÆDALOPELTIDÆ new family

There are three genera of lithistid sponges which may be regarded, albeit with some doubt, as being derived from Carnosa, that is to say, probably from the family Halinidæ, owing to the fact that at least some (if not all) of the typical desmoid spicules appear at least possibly to be modified calthrops. While this is far from being certainly the case, the indications are greater in this direction than in any other, and therefore allocation is made to the Carnosa.

Dædalopelta Sollas has discotriænes as its principal spicules. There are also very much deformed desmas, and for microscleres spirasters to streptasters. The genotype *D. nodosa* Sollas (1888, p. 342) is a West Indian species. *Lyidium* Schmidt is so ill-known that it is put here only by the mere surmise. *Vetulina* Schmidt has desmas with considerable resemblance to calthrops; its type, *Vetulina stalactites* Schmidt (1879, p. 19), is a West Indian species.

HYALOSPONGIÆ Vosmaer

This class, which is frequently called Hexactinellidæ, is customarily differentiated for the possession of spicules having actines directed in five or six directions from a central point. While it is true that the only sponges having such for principal spicules occur in this class, it is also to be noticed that spicules answering to this general description do occur here and there throughout the Demospongiæ. Probably the most distinctive characteristic of the class Hyalospongiæ is the extreme commonness of the comparatively wide dispersion of the protoplasmic structures with reference to the very conspicuous mineral skeletal basis. It is moderately common for the cells of all sponges to be spread out on the frame work, but the situation is most pronounced in the Hyalospongiæ. The flagellate chambers are large, thimble-shaped, with wide exhalent openings, and are grouped (as a rule) about a large central cloaca, almost as in the so-called sycon sponges of the Calcispongiæ. The size is average for the phylum, rather greater than in the Calcispongiæ. Colors are always dull, often pale drab. Consistencies vary from softly fragile to strong hard, never being elastic. As a rule there are many kinds of comparatively elaborate spicules, including the most elaborate ones of the entire phylum. Spongin never occurs, and the spicules are frequently united together at their ends by siliceous material to make an inflexible framework. There frequently are present spicules called amphidiscs, which resemble in minute detail those of such genera of Demospongiæ as *Iotrochota* and *Meyenia* (order Haplosclerina). Relationship with the Demospongid genus *Acarnus* is indicated by the rays of the Hyalospongid discohexasters, which have peculiar structures also found in the "rose stem" and "palm tree" of the above-mentioned genus. In general this class occurs at considerable depths, being found near the surface only in extremely cold waters.

Inasmuch as Ijima in the *Siboga* report (1927) goes with considerable detail into a revision of this class, it is not deemed necessary at the present time to take it up to so great an extent as was thought advisable for the preceding one.

HEXASTEROPHORA Schulze

The principal characteristic of this order is the possession of astrose microscleres. Just as the Demospongia might be divided into two subdivisions, first a quartet of orders, the Keratosa, Haplosclerina, Pœcilosclerina and Halichondrina, never having astrose microscleres and frequently having chelas, and second a quartet of orders, the Hadromerina, Epipolasida, Choristida and Carnosa, regularly having astrose microscleres and never having chelas, so the Hyalospongiæ may be divided into the Amphidiscophora frequently having the amphidiscs (which correspond exactly to chelas) and never having the astrose microscleres, in contrast to the Hexasterophora having astrose spicules regularly present and never having amphidiscs. There is another significant difference. Very many of the genera of the Hexasterophora have the principal skeletal spicules fused tip to tip to make a rigid so-called dictyonine frame-work, which is not found in the contrasting order Amphidiscophora.

The Hexasterophora might conveniently be divided again into two subdivisions. One would be the well-marked suborder sometimes known as the Hexactinosa or Uncinataria, and secondly, in contrast, the pair of suborders known as the Lychniscosa and the Lyssacinosa.

The suborder Hexactinosa Schrammen comprises only dictyonine sponges, that is to say those having skeletal spicules fused together to make a rigid network; diactinal spicules are wanting and the sponges seem always to have been attached to the bottom. The nodes of junction of the spicules are never perforated to form the structures called lychniscs or "lantern nodes." The families and genera of this suborder will be taken up briefly.

HEXACTINELLIDÆ Schmidt

This family has been known as Tretodictyidæ Schulze, but the genus *Hexactinella* Carter, which belongs rightfully here, antedates *Tretodictyum* Schulze, having been established in 1885, whereas the latter was not established until 1886. It should be divided into two subfamilies, the Craticularinæ and the Hexactinellinæ. The latter corresponds very closely to Schulze's Tretodictyidæ, and will be discussed first.

Of this family, *Anomochone* Ijima needs to have its genotype understood as being *Anomochone expansa* Ijima (1927, p. 269). *Auloplax* Schulze has hexactinoid discohexasters only. *Cyrtaulon* Schulze is the only member of this family that seems to be represented from the West Indian region, namely, by the sponge described by Schmidt (1880, p. 58), as *Volvulina sigsbeei,* the genotype of *Volvulina.* This latter name, however, having been pre-empted for a Gastropod Mollusk in 1865, was replaced by Schulze in 1886 with the name cited above. Other genera that belong properly here include also *Hexactinella* Carter, *Psilocalyx* Ijima, *Sclerothamnopsis* Wilson, *Tretocalyx* Schulze, *Tretodictyum* Schulze, and *Uncinatera* Topsent. The genotype of *Tretodictyum* should be established as *T. tubulosum* Schulze (1886, p. 78).

Names that are to be considered here, but which are to be regarded as dropped into synonymy, include *Dendrospongia* Murie, which having been preoccupied was replaced with *Sclerothamnus,* and the above-mentioned *Volvulina,* a synonym of *Cyrtaulon.*

CRATICULARINÆ Rauff

It has been customary to regard this group, as did Rauff, as of full family rank. The Craticularinæ are well represented by fossils and are of considerable interest to the palæontologist, but have only one recent representation as yet recorded. This is *Tretorete* Ijima, of which three small specimens have been found in the East Indies.

APHROCALLISTIDÆ Gray

Whereas sponges belonging to this family are moderately common as compared to other families of the Hyalospongiæ, the number of genera needed to classify them adequately is very small. Most of the species, in fact, may be classified within the one genus *Aphrocallistes* Gray, of which *Aphrocallistes bocagei* Wright (1870, p. 77) has been recorded by Schmidt from the West Indian region. The other genus of this family is *Heterochone* Ijima.

FARREIDÆ Gray

This family seems to be well represented by sponge specimens from the West Indian region, but the classification of these specimens into species is rather confusing. Apparently all the West Indian forms belong to the genus *Farrea* Bowerbank. One species that would be very interesting to investigate in this connection is *Farrea facunda* Schmidt (1870, p. 16). *Farrea gassioti* Bowerbank (1875, p. 272), *F. infundibularis* Carter (1873, p. 360), and *F. mexicana* Wilson (1904, p. 61) have been recorded from the West Indian region. Furthermore, to judge from the text of the above-mentioned 1875 reference to Bowerbank, the following other species may possibly have occurred in the West Indies: *aculeata, fistulata, lævis, parasitica, pocillum, robusta, spinifera, spinossisima* and *valida.* A greater question concerns the likelihood that these latter eight are perhaps conspecific.

Other genera properly belonging in this family include *Claviscopulia* Schulze, *Lonchiphora* Ijima and *Sarostegia* Topsent.

Generic names which must be considered in this connection include *Aulodictyon* Saville Kent, which is a synonym of *Farrea,* and *Ramella* Schulze, which is a synonym of *Sarostegia.*

AULOCALYCIDÆ Ijima

This family is represented from the West Indies by the genus *Rhabdodictyon* Schmidt, of which the genotype *R. delicatum* Schmidt (1880, p. 46) came from the vicinity of the Dry Tortugas.

Other genera belonging properly in this family comprise *Aulocalyx* Schulze, *Euryplegma* Schulze, *Fieldingia* Saville Kent and *Tretopleura* Ijima.

EURETIDÆ Sollas

This large and important family has several representatives from the West Indian region. In the genus *Dactylocalyx* Stutchbury, we find that the genotype *pumiceus* Stutchbury (1841, p. 86), also *D. potatorum* Schmidt (1880, p. 53) and *D. subglobosus* Gray (1867, p. 506) are all recorded from the West Indies. *Diaretula,* which is very briefly and perhaps unrecognizably described, and therefore placed in this family only by surmise, is entirely a West Indian genus. The genotype *D. cornu* Schmidt (1880, p. 45) and the other species, *D. murella* Schmidt (1880, p. 46) both are cited from that part of the world. *Lefroyella* Wyville Thomson is represented from the West Indian region by its genotype *decora* Wyville Thomson (1877, p. 401). The same is true of *Margaritella* Schmidt, of which the type *cœloptychoides* Schmidt (1880, p. 54) is West Indian. *Myliusia* Gray is represented from the West Indies by its type *M. callocyathis* Gray (1859, p. 439) and also by the sponge described originally as *Scleroplegma conica* by Schmidt (1880, p. 57) (new transfer).

Other genera belonging to this family include: *Bathyxiphus* Schulze, *Calyptorete* Okada, *Chonelasma* Schulze, *Conorete* Ijima, *Endorete* Topsent, *Eurete* Semper, *Gymnorete* Ijima, *Heterorete* Dendy, *Hyalocaulus* Marshall, *Iphiteon* Bowerbank, *Pararete* Ijima, *Periphragella* Marshall, *Pityrete* Topsent, *Pleurochorium* Schrammen, *Ptychodesia* Schrammen and *Scleroplegma* Schmidt.

The order Hexasterophora other than Hexactinosa comprises two additional suborders, the Lychniscosa and Lyssacinosa, of which the former comprises only a very few genera and species. It is here proposed that they be treated as all in the one family Aulocystidæ.

AULOCYSTIDÆ Schulze

In this family the spicules are united together at their ends to make an inflexible framework, the condition known as dictyonine, but here there is this additional peculiarity that at the point of junction there are several branching strands of silica, so that, as it were, a little basket is present.

The family is here divided into two subfamilies, the first, the Aulocystinæ, includes only the one genus *Aulocystis* Schulze. This genus is represented from the West Indies by that species which was first described under the name of *Myliusia grayi* by Bowerbank (1869, p. 335); this should be taken as the genotype of *Aulocystis*.

DIAPLEURINÆ Ijima

The only genus that undoubtedly belongs to this subfamily is *Diapleura* Ijima. In addition to this we have for consideration *Diplacodium* Schmidt, which is not very satisfactorily described; of it, the genotype, *Diplacodium mixtum* Schmidt (1880, p. 57) is a West Indian species.

The suborder Lyssacinosa of the Hexasterophora may be distinguished sharply from all other members of the order because of the frequency with which its spicules are not at all united together in the dictyonine fashion. It is true, however, that older specimens do show some rigidity of this sort.

PLACOPLEGMIDÆ new family

This name is hereby proposed for the group designated as Leucopsacasidæ by Ijima, because *Placoplegma* was established in 1896, two years before *Leucopsacus* had been erected. This family includes *Caulocalyx* Schulze (1886) with some doubt, owing to its lack of hexact parenchymalia; this genus may properly belong in the Rossellidæ. If its location in the Placoplegmidæ is proper, it would be the oldest genus there, but it should not be taken as the type genus of the family because of the dubious nature of its systematic position. *Chaunangium* Schulze is also somewhat dubious as to its proper location here. *Chaunoplectella* Ijima is typical of the family, as is also *Leucopsacus* Ijima and *Oopsacas* Topsent. *Placoplegma* Schulze has already been mentioned above.

ALCYONCELLIDÆ new family

This new family designation is established to take the place of Euplectillidæ Gray, inasmuch as *Alcyoncellum* Quoy and Gaimard was established in 1833, eight years before the establishment of *Euplectella* Owen.

EUPLECTELLA Owen

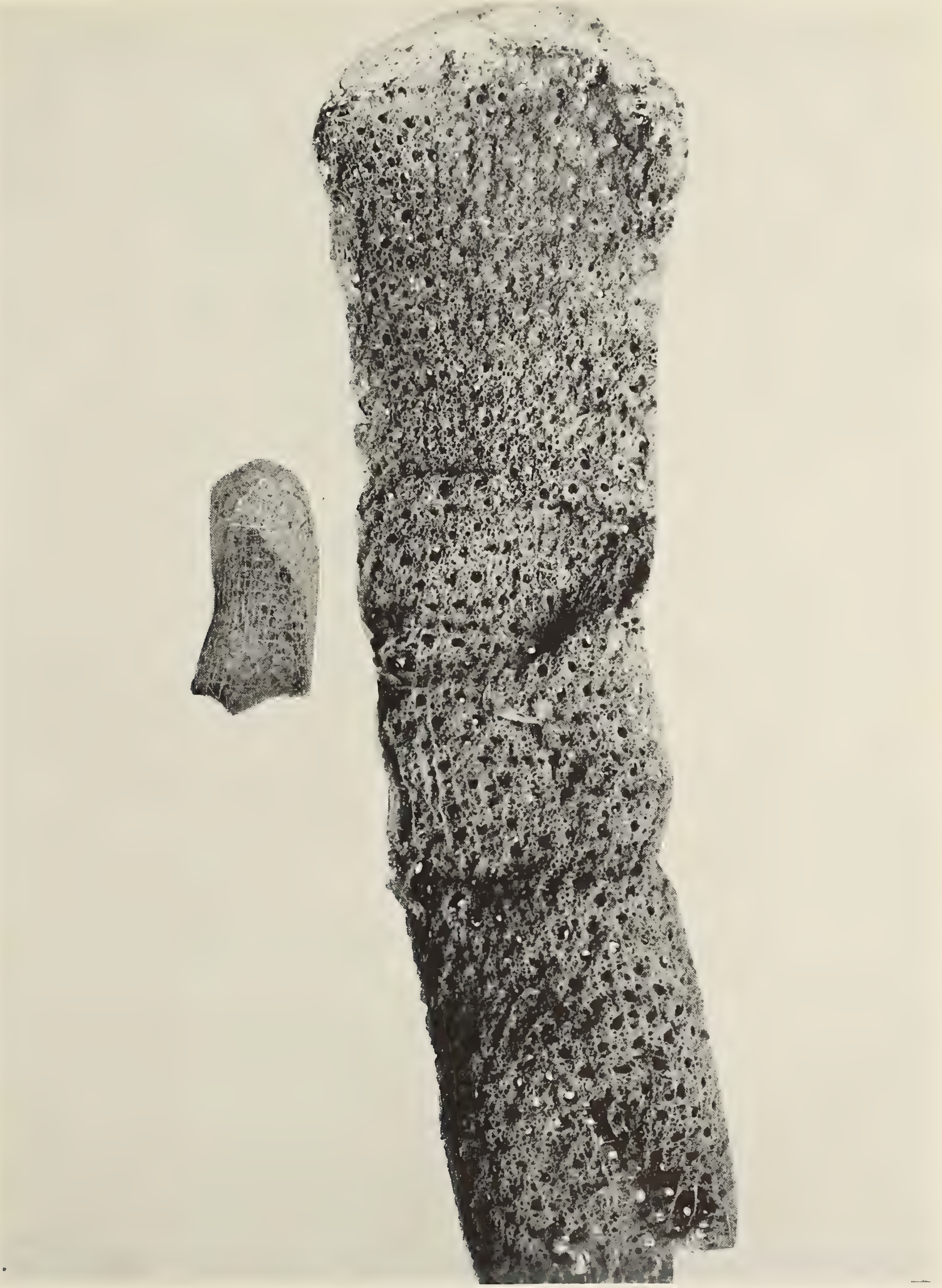
This genus is characterized by its possession of sharply pointed stauractines, pentacts and hexacts. The microscleres are usually of three sorts, comprising floricomes and graphicomes. The shape is typically cylindrical with an elaborate sieve over the otherwise open distal ends. This genus is represented from the West Indian region doubtfully by *Euplectella nodosa* Schulze (1886, p. 39) and certainly by the Dry Tortugas species recorded below.

Euplectella jovis Schmidt

Plate 21.

Two fragments of this species were dredged July 30, 1932, from a depth of 1047 meters south of Loggerhead Key. This location is in the Gulf Stream within about 70 kilometers of the Coast of Cuba.

Euplectella jovis is typically an elongate vase with a sieve over the otherwise open cloacal end. Of the specimens collected, the larger fragment, the one having on it the cloacal sieve, is 9 cm. in diameter and 33 cm. long. The smaller, which is finer grained, is 2.5 cm. in diameter and 15 cm. long. It is presumably, but not certainly, the lower portion of the larger piece. If this were true, a considerable intermediate portion must have been lost. It may be instead that there were two specimens of which the cloacal sieve was lost from one and the basis of attachment was lost from the other. In each case, as is typical of the species *jovis*, the walls are about 2 to 3 mm. thick, and are abundantly pierced with apertures. There are circular openings 2 mm. in diameter, 8 mm. apart from center to center, and there are numerous smaller ones 1 mm. in diameter and 3 to 4 mm. apart from center to center. The cloacal sieve is made up of fibers 175μ thick, outlining meshes that are often rectangular but sometimes triangular or polygonal, 2 to 3 mm. in diameter. The fibers in question are merely fascicular tracts of spicules, each 10μ thick. The surface bears a general resemblance to wet bread not having any crust upon it. The color on collection was a dull brownish white. The consistency is stiff, but very flexible. It is noteworthy that there are no conspicuous external ridges meandering about over the surface. A coronal fringe of erect spicules is found around the sieve plates of typical specimens of *jovis*, but this feature is less noticeable in the Dry Tortugas specimens. Unlike other members of the genus *Euplectella*, *jovis* seems never to have the spicules fused together, even when the specimen is large and therefore presumably comparatively old. This was quite evident in the specimens under consideration at the present time. In the Dry Tortugas specimens, the hexactinal hypodermalia are sword shaped, which is the rule in *jovis*. The parenchymalia include not only pentacts and occasional hexacts, but also very numerous T-shaped triacts, which situation is very characteristic of the species *jovis*. I do not find the fibule which is very noteworthy (according to published descriptions) of *Euplectella jovis*; this is a spicule sort with a straight thickened central portion and sigmoid terminal rays at each end. Instead, however, I do find single sigmoid spicules, which are perhaps homologous.



Euplectella jovis, approximately life size, photographed after preservation in alcohol. Where torn at lower right, central hollow shows. Oscular sieve is at upper end as here placed. Smaller fragment was an attached (lower) end, but not certainly of larger fragment illustrated; it may have belonged to second specimen.

Euplectella jovis was described by Schmidt (1880, p. 60) from the West Indian region. The Dry Tortugas specimens agree with it in so many instances that in spite of the slight differences mentioned above, I have little hesitation in making the identification. It lacks the fibules and has only a weak development of the coronal spicules fringe, but it is like *jovis* in lacking the exterior ridges, in having the sword-shaped hypodermalia, in having abundant triacts of T shape and in having the persistent lyssacine condition. These last four traits separate *jovis* sharply from other members of the genus.

Other genera of the family Alcyoncellidæ which are recorded from the West Indian region include *Hertwigia* Schmidt, of which the genotype *H. falcifera* Schmidt (1880, p. 62) is from near the Dry Tortugas; *Regadrella* Schmidt, of which the genotype *R. phoenix* Schmidt (1880, p. 61) is West Indian, and also *Rhabdopectella tintinnus* Schmidt (1880, p. 62), the one species of that genus.

Other genera of this family include *Acœlocalyx* Topsent, the above-mentioned *Alcyoncellum* Quoy and Gaimard, *Bolosoma* Ijima, *Dictyaulus* Schulze, *Dictyocalyx* Schulze, *Docosaccus* Topsent, *Heterotella* Gray, *Holascella* Lendenfeld, *Holascus* Schulze, *Hyalostylus* Schulze, *Malacosaccus* Schulze, *Placosoma* Ijima, *Saccocalyx* Schulze, *Symplectella* Dendy, *Trachycaulus* Schulze, and *Walteria* Schulze. The genotype of *Malacosaccus* should be established as *M. vastus* Schulze (1886, p. 41).

Other generic names which need to be considered in this connection comprise *Corbitella* Gray, which is to be taken as a synonym of *Alcyoncellum*, inasmuch as *A. speciosum* Quoy and Gaimard (1833, p. 302) is to be taken as genotype of both *Corbitella* and *Alcyoncellum*. Other synonyms of *Alcyoncellum* include *Eudictyon* Marshall, *Eudictyum* Schulze, *Habrodictyon* Wyville Thomson, and *Tægeria* Schulze. *Hyalodendron* Moore is a synonym of *Euplectella*.

SYMPAGELLIDÆ new family

This is proposed as a new name for that hitherto called Caulophacidæ by Ijima, because the genus *Sympagella* Schmidt 1870 antedates by 16 years *Caulophacus* of Schulze.

This family is here understood to include the following: *Aulascus* Schulze, which may be a synonym of *Sympagella; Balanella* Schulze which is probably a synonym of *Caulophacus; Balanites* Schulze, which is a synonym of *Balanella* and has been dropped because the name was preoccupied; *Calycosilva* Lendenfeld, which is probably a synonym of *Sympagella; Caulodiscus* Ijima; *Caulophacella* Lendenfeld; *Caulophacus* Schulze, of which the genotype needs to be understood as being *Caulophacus latus* Schulze (1886, p. 46); *Polyrhabdus* Schulze, which having been preoccupied, is replaced by *Pleorhabdus* Schulze; also, as mentioned above, there is the type genus *Sympagella* Schmidt.

LANUGINELLIDÆ Schulze

This family is here divided into two subfamilies, the Lanuginellinæ and the Askonematinæ. The first of these includes *Calycosoma* Schulze, *Doconesthes* Topsent, *Lanuginella* Schmidt, *Lanugonychia* Lendenfeld, *Lophocalyx* Schulze, *Mellonympha* Schulze and also *Polya* Stechow, which is a synonym of *Lophocalyx*, and *Polylophus* Schulze, which is a synonym of *Lophocalyx*.

ASKONEMATINÆ Gray

Ijima has replaced Gray's older name, Askonematinæ, with his Rossellidæ, but *Askonema*, which was established in 1870, antedates by two years the genus *Rossella*. *Askonema* Saville Kent is represented from the West Indies by *A. kenti* Schmidt (1880, p. 65). This genus has often been incorrectly spelled *Asconema*; see literature references in Ijima (1927, p. 376).

Genera which are here understood as belonging in the subfamily Askonematinæ are the following: *Acanthascus* Schulze, of which the genotype needs to be understood as being *A. cactus* Schulze (1886, p. 49); *Acanthosaccus* Schulze, which is a synonym of *Rhabdocalyptus; Anaulosoma* Kirkpatrick, which is a synonym of *Rossella; Anoxycalyx* Kirkpatrick; *Aphorme* Schulze; *Askonema* Saville Kent; *Aulochone* Schulze; of which the genotype is to be understood as *A. lilium* Schulze (1886, p. 55); *Aulorossella* Kirkpatrick which is a synonym of *Rossella*, of it the genotype needs to be understood as being *Aulorossella levis* Kirkpatrick (1907, p. 17); *Aulosaccus* Ijima; *Bathydorus* Schulze, of which the genotype needs to be understood as being *B. fimbriatus* Schulze (1886, p. 50); *Calycosaccus* Schulze, which is a synonym of *Aulosaccus; Crateromorpha* Gray; *Gymnorossella* Topsent; *Hyalascus* Ijima; *Rhabdocalyptus* Schulze, of which the genotype needs to be understood as being *R. mollis* Schulze (1886, p. 51); *Rossella* Carter; *Schaudinnia* Schulze; *Scolymastra* Topsent; *Scyphidium* Schulze; *Staurocalyptus* Ijima; *Trichasterina* Schulze; and *Vitrollula* Ijima, of which the genotype needs to be understood as being *V. fertile* Ijima (1898, p. 47).

AMPHIDISCOPHORA Schulze

This order is separated from the Hexasterophora by its possession of amphidiscs as microscleres and its corresponding lack of asters. Unlike most of the Hexasterophora (but resembling the last few families therein discussed) the sponges of this order do not have the spicules fused to make a rigid dictyonine framework.

PHERONEMATIDÆ Gray

This family is here divided into two subfamilies, of which the principal is the Pheronematinæ, and may be distinguished from the other, the Semperellinæ, by the possession of "bowl-like" open cloacas.

The genera here included in the Pheronematinæ are *Holtenia* Wyville Thomson, which is a synonym of *Pheronema*, *Labaria* Gray, *Pheronema* Leidy, *Platylistrum* Schulze, *Poliopogon* Wyville Thomson, and *Sericolophus* Ijima.

SEMPERELLINÆ Schulze

This subfamily, a small one, is differentiated from the preceding one by its possession of special oscular areas on the exterior instead of any large wide-open cloaca. It comprises in addition to the genus *Semperella* Gray, three others, all of which are probably to be regarded as synonyms of *Semperella*. They are *Hyalothauma* Herklots and Marshall, *Meyerella* Gray and *Meyerina* Gray.

MONORHAPHIDÆ Ijima

This family, comprising as it does only one genus, is nevertheless one of the most distinctive in the whole phylum Porifera. These sponges have, instead of a tuft of long hair-like spicules at their base, as is true of fairly numerous others of the Hyalospongia, one enormous gigantic spicule, frequently nearly 1 cm. in thickness. What the embedded end of this may be is unknown, as specimens in collections always have broken off. It would be very interesting to ascertain the means by which (probably through some syncytial cellular cooperation) this enormous spicule is manufactured in the body of the sponge.

The unique genus is *Monorhaphis* Schulze, of which the genotype is *M. chuni* Schulze (1904, p. 112).

HYALONEMIDÆ Gray

The typical genus of this family is *Hyalonema* Gray, which is one of the most abundant of all the genera of Hyalospongiæ. It is represented from the West Indian region by *Hyalonema schmidti* Schulze (1899, p. 6).

Other genera belonging properly in this family include *Carteria* Gray; *Chalaronema* Ijima; *Compsocalyx* Schulze; *Hyalochæta* Brandt, which is a synonym of *Hyalonema; Hyalotrix* Gray, which is a synonym of *Hyalonema,* and finally *Lophophysema* Schulze.

CORYTHOPHORIDÆ new family

The family is here established for the very peculiar genus *Corythophora* Ferrer Hernández, which was established in 1932 (p. 99) for *Corythophora ijimai,* a Japanese sponge. Except that this is clearly one of the Amphidiscophora, its other systematic relationships are obscure. Like the Pheronematinæ, it has pentacts as an important skeletal element in addition to uncinates. Like the Hyalonemidæ, it has basal spicules that terminate in cones, but differs in that the rhabdodiactines do not form the principal skeleton. On top of all this there is an additional peculiarity that there are present very peculiar spicules termed by Ferrer Hernández "xylostyles," which are twisted and often bent like a letter J at one end.

INCERTÆ SEDIS

There are various genera of sponges, of which the class and order is not clear on the basis of their very brief description. The majority of these would appear to belong to the Hyalospongia by surmise.

Adrasta Wyville Thomson has no more description than that it is "Vitrea," meaning one of the Hyalospongiæ. *Caliplera* is mentioned by Vosmaer (1885, p. 241) as being a genus established by Gray, but it does not seem possible to find this in any reference by that author. *Callisphæra* Gray (1870, p. 311) is not recognizable on the basis of published description. If there are specimens in the British Museum the genus could probably be described adequately from them. *Cyathella* Schmidt is probably one of the Hyalospongia, but unrecognizable; its genotype, *C. lutea* Schmidt (1880, p. 46), is mentioned from the West Indies. *Cystispongia* Roemer is a genus found principally in the fossil form and is probably but not certainly hyalospongid; Schmidt in 1880 (p. 51) identified a West Indian sponge which he describes very briefly as being *C. superstes. Deanea* Bowerbank (1875, p. 275) is also probably one of the Hyalospongia, otherwise is unrecognizable. *Joanella* Schmidt (1880, p. 55), represented from the West Indies by *J. compressa,* is almost certainly hyalospongid. *Leiobolidium* Schmidt is mentioned in the discussion of sponges from the West Indies, but is merely a generic designation, no described species existing. *Lophurella* Gray is very inadequately known. This is spelled *Lophiurella* in the Zoological Record. *Pachaulidium* Schmidt, like *Leiobolidium,* is a genus discussed in connection with West Indian sponges but provided with no species whatsoever. *Placodictyum* Schmidt is represented from the West Indian region by its type *P. cucumaria* Schmidt (1870, p. 16), but its systematic position can not be made out on the basis of the very brief description given. *Rhabdostauridium* Schmidt is represented from the West Indian region by its genotype *R. retortula* Schmidt (1880, p. 59), but is utterly unrecognizable. *Syringidium* Schmidt is represented from the West Indian region by its type, *S. zitteli* (1880, p. 46). A very lengthy description is given of this sponge and it may ultimately prove to be recognizable, but I am unable, on the basis of the information given, to allocate it at present. Finally there is the unrecognizable genus *Vazella* of Gray, of which the genotype needs to be understood as being *Holtenia pourtolesi* Schmidt (1870, p. 14).

CALCISPONGIÆ Schmidt

This class is usually separated from the other two classes, Hyalospongiæ and Demospongiæ, by the fact that its skeleton is made of spicules composed of calcium carbonate. Another sharp point of difference is that its cells are often two or three times larger than those in the other classes of Porifera. Aside from these two items, some members of the leucon genera are almost indistinguishable from the sponges belonging in the order Choristida of the class Demospongiæ. Still another item that needs emphasis is the great variety of architecture found in the Calcispongiæ. Whereas a few have the complicated architecture characteristic of the other classes, the majority of the Calcispongiæ are very simple. The flagellate cells may indeed be distributed on but a single concavity, this then being known as the ascon type. Again they may be on an elaborately branched but otherwise single cavity, this architecture being known as the sycon type. Finally, as is true of the majority of sponges, the flagellate cells may be disposed on the interiors of very numerous separate concavities, this then being referred to as the leucon type. As in the Hyalospongiæ there is frequently a symmetrical plan to the body of the sponge, a central cloaca being surrounded by thinner or thicker walls containing the flagellate cells and their associate amœboid cells and skeletal structures. Whereas the Demospongiæ are found in both shallow and deep water, the Hyalospongiæ in only the depths, in contrast, the Calcispongia are confined almost exclusively to what might be termed shallow water, frequently actually within the intertidal region.

SYCONOSA new order

Dendy and Row in 1913, monographing the Calcispongiæ, there referred to as the Calcarea, present ample evidence for the separation of all the families in this group into two categories, each with many points of similarity to the other, having followed similar lines of evolution, but showing evidences of separate derivation each from its own common ancestor. In both of these two groups are found all the principal types of spicules that occur in the class, namely: diactinal, triactinal and tetractinal forms, the latter two sorts being either regular or alate. In each, many of the genera are leucon; that is to say have the architecture that is found also in the other two classes, particularly in the Demospongiæ. The flagellate cells are disposed about the concave surfaces of small chambers which are connected to the outside through relatively small apertures. In each of these categories some of these leucon sponges have the so-called pharetrone modification, which is exemplified by the occurrence of "tuning-fork" spicules, and more or less welding of the spicules together as a rigid framework. In the first of the two divisions indicated roughly by Dendy and Row, there is considerable emphasis on the sycon type of architecture; very many of the genera have only this form, and the others give pronounced indications that they have passed through it in their attainment of a final leucon structure. In contrast the second group represents sponges that appear to have passed almost directly from the ascon to the complicated leucon type. Below, under the topic of the Leucaltidæ remarks will be made as to the intermediate form corresponding to the sycon, which comes between the ascon and the leucon in this latter group. A still further point of separation between the two categories that may be perhaps the most significant of all is brought out by Dendy and Row in connection with those specimens of which they have adequate histological information. In all such cases it appears that for the first group, the nuclei of the flagellate cells are apically located, that is to say, near the base of the flagellum; whereas in the second category, the nucleus of the flagellate cells is basically located at the end of the cell opposite to the flagellum, and instead near the point of attachment of said cells to the concave surface on which they are placed. Because of the emphasis on the sycon form in the first of these categories, it is here proposed that it be known as the Syconosa.

Dendy and Row divide the Calcispongiæ on the basis of whether or not the flagellate chambers are disposed on one continuous surface, which condition they refer to as homocœlous, or whether the flagellate cells be disposed upon chambers that separate them distinctly from each other, which condition they refer to as heterocœlous. It will be noted that the Heterocœla comprise members of the two categories listed above, and represent a degree of advancement or grade of attainment, rather than any phylogenetic separation. It is here proposed that the use of the terms Heterocœla and Homocœla as systematic classes or orders be discontinued in view of the fact that it is preferable to use bases of separation that do have phylogenetic significance whenever such can be discovered.

The alternative order of Calcispongiæ, the Asconosa, contains in the family Leucosoleniidæ some species with apical nuclei. If these could be distinctly separated, as would seem very desirable, the family Leucosoleniidæ might be transferred with them to the Syconosa, requiring another family (perhaps Clathrinidæ Minchin) in the Asconosa for the remaining species. Unfortunately, as Dendy and Row (1913, p. 718) show, very many of the Leucosoleniidæ are intermediate in all respects and can not possibly be sharply classified. Quite plausibly this indicates their primitive nature. They are likely ancestral to both the orders here employed and are left in the one rather than in the other merely for convenience.

The Syconosa are here divided into five families; first the Grantiidæ in the same sense as that of Dendy and Row but with a subfamily split off for the Leucon forms (Leuconinæ), second the Scyphidæ (corresponding to Sycettidæ), third the Amphoriscidæ, fourth the Lelapiidæ and fifth the Djeddeidæ, replacing .Heteropiidæ).

GRANTIIDÆ Dendy

The typical members of the family Grantiidæ, such as for example the genus *Grantia*, represent the sycon type of architecture in its fullest development. There is a central cloaca surrounded by radiately placed elongate flagellate chambers, about the outside of which there is a distinct cortical structure, containing tangentially placed spicules. The family as here used is practically identical with that of Dendy and Row (1913, p. 757). It is deemed advisable to divide the family into two subfamilies on the basis of the architecture, inasmuch as many of the genera assigned to this family are decidedly leucon when they finally reach maturity. In fact the genus *Leuconia* itself is in this family.

SCOPE OF THE SUBFAMILY

Of the Grantiinæ, that is to say, the typical genera belonging to the family Grantiidæ, it does not appear from the literature that any occur in the West Indian region. The following genera may be regarded as belonging here: *Acramorpha* Jenkin; *Anamixilla* Poléjaiff; *Grantia* Fleming; *Grantiopsis* Dendy; *Hypograntia* Carter; *Sycaltis* Haeckel; *Sycodorus* Dendy and Row; *Sycometra* Haeckel; *Synute* Dendy; *Teichonopsis* Dendy and Row; and *Uteopsis* Dendy and Row.

Other generic names which need to be considered in connection with this family include quite a large number that are synonyms of *Grantia*, and also the name *Utella* Dendy which is a synonym of *Sycodorus*. With regard to the genus *Ute* Schmidt, Dendy and Row (1913, p. 764) state that the genotype is *Ute glabra*, but this species was not in the genus as originally established. Instead at that time it contained only the one species *Ute capillosa* Schmidt (1862, p. 17), which therefore must be regarded as the genotype of *Ute*. Since Dendy and Row (1913, p. 759) show that this is congeneric with other species belonging in the genus *Grantia*, the real genus *Ute* falls in synonymy to *Grantia*, but a new generic name is required for the remaining species of *Ute*, which are not congeneric with the type and which are therefore not congeneric with *Grantia*. It would appear consistent with the procedure of zoological nomenclature to take as the name of this genus the term *Sycurandra* which was employed as a subgeneric name for one of the members of this group by Haeckel (1872, p. 389). The genotype of this new genus *Sycurandra* will therefore accordingly be the species originally described as *Ute glabra* Schmidt (1864, p. 23). Another generic designation which needs to be noticed at the present time is the above-mentioned genus *Sycaltis*, of which the genotype needs to be understood as being *Sycaltis perforata* Haeckel (1872, p. 266). Various generic names which are synonyms of *Grantia* are as follows: *Artynas* Haeckel, *Artynella* Haeckel, *Artynes* Gray, *Artynium* Haeckel, *Artynophyllum* Haeckel, *Calcispongia* de Blainville, *Dermatreton* Jenkin, *Sphenophorina* Breitfuss, *Sphenophorus* Breitfuss, *Sycophyllum* Haeckel, *Sycortis* Haeckel, *Sycortusa* Lendenfeld, and lastly that genus which was referred to by Lendenfeld (1885, p. 1111) as *Vosmæria;* Fristedt in 1885 (p. 24) also erected a genus which he called *Vosmæria*. Burton (1930, p. 672) attributes this latter genus to Levinsen, but this is evidently a lapsus. It seems impossible at present to be sure which of the two 1885 genera was published the sooner, but because that of Fristedt has been frequently since used, and because that of Lendenfeld is a synonym of another genus, it would appear advisable to replace the latter, rather than the former, with a new name. It is here suggested that the name *Hozawaia* be substituted instead of *Vosmæria* of Lendenfeld. This generic name is given in respect to the eminent zoologist, Professor Sanji Hozawa of Tohoku Imperial University, Sendai, Japan.

LEUCONIINÆ new subfamily

The subfamily is here established for those genera of the family Grantiidæ which have the flagellate chambers more nearly spherical than the elongate ones of the typical genera. Furthermore, these flagellate chambers are connected with the exterior by relatively small tubelike structures, so that these sponges belong to the sort known as leucons. This subfamily is represented from the West Indian region by several species, including that to be described below. Poléjaeff (1884, p. 54) records *Leuconia multriformis* from the Bahamas, on page 56 he records *L. typica*, and on page 58 *rudifera* from the same locality. All three of these were new species in the 1884 reference cited.

LEUCONIA Grant

In this genus the cloaca is always conspicuous and there is usually but one. The architecture is typically leucon. There is a special dermal skeleton containing tangential spicules, or tangentially placed rays of spicules. Below that the principal skeleton is confused. The diactinal spicules, if any, occur approximately perpendicular to the surface.

Leuconia barbata (Duchassaing and Michelotti) new combination

Plate 18, fig. 4.

Four specimens were dredged June 24, 1932, east of Loggerhead Key, at a depth of 17 meters.

Each is elongate oval, about 1 cm. in diameter and 3.5 cm. long. The cylinder is hollow, with walls about 2 mm. thick, and at the upper or distal end there is the opening of the cloaca, which is about 8 mm. in diameter. The coacal rim is smooth, without any optically evident coronal fringe of spicules. The color is dirty white. The consistency is soft and friable. Around the rim of the coacal opening is a zone extending down into the sponge some 500μ, which is packed with T-shaped sagittal triradiates, their clads parallel to the rim and their rhabds perpendicular to it. Each of the rays is about 9 by 250μ. Below this is a palisade of oxeas, side by side, perpendicular to the rim, each about 20 by 660μ. It will be noted that these are parallel to the long axis of the cloaca and constitute a wall or lining around it. Below them, on the so-called gastral layer, around what might be termed the "throat" of the body cavity, is a zone or circle of large quadriradiates, of which each ray is about 50 by 400μ. From here on down into the interior the so-called gastral dermis is full of smaller quadriradiates, mostly with clads 40 by 420μ, and rhabds 48 by 560μ, but with many of them smaller; some have rays only 10 by 160μ. The outer surface of the sponge is profusely echinated by oxeas perpendicular to it, half inside the sponge and half projecting. These spicules are about 25 by 2500μ. Immediately below the surface occur numerous sagittal triradiates, their clads in the dermal layer, their rhabds projecting into the chamber layer below, at right angles to the surface. These spicules have clads about 20 by 500μ and rhabds 20 by 700μ. Throughout the chamber layer, in addition to these subdermal sagittal triradiates and the proximal halves of the echinating oxea, occur also numerous triradiates only slightly sagittal or alate; their rays are from 20 by 200μ to 40 by 400μ. There are numerous symmetrical oval elongate subdermal chambers, perhaps corresponding to inhalent canals, perpendicular to the outer surface of the sponge, and about 200 by 800μ in size. Other gross chambers occur just inside the gastral surface, perpendicular to it, and perhaps are to be interpreted as representing exhalent canals. They are very irregular in outline, like sinuses; their measurements are roughly 200 by 500μ. The two types above mentioned interdigitate. In the walls separating them side from side are found the subspherical flagellate chambers, which are some 50 to 75μ in diameter.

Although this sponge was described in 1864 (p. 111) by Duchassaing and Michelotti as *Medon barbata*, it will be noted that it is a typical specimen of the genus *Leuconia*, much like all the other numerous species of this genus. *Leuconia* is well represented in all the major geographical regions, but only in shallow ocean.

Scope of the Subfamily

Those genera which are here understood as being in the subfamily Leuconiinæ include the following: *Aphroceras* Gray; *Baeria* Miklucho Maclay; *Eilhardia* Poléjaeff, *Jenkina* Brøndsted, of which the genotype needs to be understood as *Leucandra hiberna* Jenkin (1908, p. 14), *Kuarrhaphis* Dendy and Row, *Lamontia* Kirk, *Leucettaga* Dendy and Row, *Leucogypsia* Bowerbank, *Leucopsila* Dendy and Row, *Leucyssa* Haeckel, *Megapogon* Jenkin, *Paraleucilla* Dendy, *Sycolepis* Haeckel.

Other generic names which need consideration in this connection include *Cyathiscus* Haeckel, which is a synonym of *Aphroceras; Trichogypsia* Carter, which is a synonym of *Sycolepis*; and in addition a large number of names all of which are synonyms of *Leuconia*. These are *Cœnostomella* Haeckel, *Cœnostomium* Haeckel, *Dyssycarium* Haeckel, *Dyssyconella* Haeckel, *Dyssycum* Haeckel, *Leucandra* Haeckel, *Leucortis* Haeckel, *Medon* Duchassaing and Michelotti, *Mlea* Haeckel, and *Sycinula* Schmidt.

SCYPHIDÆ new family

This family was designated by Dendy (1893, p. 161) as Sycettidæ, but the typical genus of the family is that which Risso in 1826 (p. 368) called *Sycon*. On the other hand, Dendy and Row (1913, p 793) show that *Scypha* Gray (1821, p. 357) is congeneric with *Sycon* and has priority over it. This is evidently based upon the assumption that *Spongia coronata* Ellis and Solander (1786, p. 190) is the genotype of *Scypha*. Because it would make as much or more confusion to adopt as genotype any other of the species that Gray assigned to his new genus, let us so establish *coronata* as the type. It is the first species he mentioned. Dendy and Row seem to feel that Gray's name should be dropped because at the time that this scientist proposed it he had the impression that sponges were plants and that he was acting as a botanist. This is not a valid reason in connection with International Rules of Zoological Nomenclature for disallowing the earlier name *Sycon* and dropping it into synonymy to the obviously later name.

The genera of this family are the simplest of those in the entire order Syconosa and may be compared closely to the ascon type. There is, however, a central axially placed cloaca about which numerous separate little chambers radiate, with their exhalent openings directed toward the above-mentioned cloaca. Each of these corresponds to a small ascon sponge, also to the flagellate chambers as found in the Grantiidæ. The outer or inhalent end of these little symmetrically grouped colonial ascon persons projects, obviously naked, not at all covered with cortex as is true in the Grantiidæ.

Scypha is represented from the West Indian region, that is to say, in this case from Bermuda, by the species described by Haeckel (1872, p. 353) as *Sycum articum* (See Poléjaeff 1884 *ca.* p. 70).

Scope of the Family

In addition to the genus *Scypha* the following genera are here understood as belonging to this family: *Streptoconus* Jenkin, *Sycandra* Haeckel, *Sycantha* Lendenfeld, *Sycarium* Haeckel, *Sycetta* Haeckel, *Sycocystis* Haeckel, *Sycute* Dendy and Row, and *Sycyssa* Haeckel. *Sycurus* Haeckel is probably to be regarded as a synonym of *Sycetta*.

In addition to the above-mentioned generic names there are others for consideration here, all of which are synonyms of *Scypha*. They are *Dunstervillia* Bowerbank, *Homoderma* Lendenfeld, *Hypodictyon* Jenkin, *Leuckartea* Haeckel, *Sycidium* Haeckel, *Sycodendrum* Haeckel, *Sycon* Risso, *Syconella* Schmidt, *Sycum* Haeckel, and *Tenthrenodes* Jenkin.

AMPHORISCIDÆ Dendy

The principal characteristic of this family is the radially arranged skeleton of long triactinal or tetractinal spicules. Each of these has its clads in or near the outer dermal layer, the rhabds projecting downward from that toward the center of the sponge. These rhabds are very large and make up the principal portion of the skeleton. The chamber system varies decidedly in the direction of the leucon, particularly in the genera *Leucilla* and *Rhabdodermella* in which the flagellate chambers are nearly spherical and are grouped in clusters like those of grapes, thus clearly deviating from the typical *Sycon* architecture. This structure has been termed sylleibid. Comparison should be made between this family and the family Djeddeidæ to be discussed below.

SCOPE OF THE FAMILY

The typical genus of the family is *Amphoriscus* Haeckel, of which the genotype needs to be understood as being *Ute chrysalis* Schmidt (1864, p. 23), inasmuch as all the other names assigned to the genus as originally set up proved to be nomena nuda. Other members are surely *Syculmis* of Haeckel and perhaps the practically unrecognizable *Amphoridium* of Haeckel, put here largely on surmise. *Ebnerella* Lendenfeld and *Sycilla* Haeckel are synonyms of *Amphoriscus.* As mentioned above, atypical members referred here in spite of their tendency to be leucon include *Leucilla* Haeckel and *Rhabdodermella* Urban. *Leuculmis* Haeckel and *Polejna* Lendenfeld are synonyms of *Leucilla.* *Leucilla* is represented from Bermuda by *Leucilla uter* Poléjaeff (1884, p. 53).

LELAPIIDÆ Dendy and Row

This family is maintained for certain genera, otherwise clearly related to the Grantiidæ, which have developed in the direction of being pharetrone. This is borne out particularly by the occurrence in them of typical triradiates in which the clads are close together so that the shape is very like that of a tuning fork. Unlike the more typical pharetrones, however, the spicules are not cemented together, although they do occur in pseudofibers or bundles in which they are placed side by side. In one genus of the Lelapiidæ, namely *Kebira*, the sagittal radiates are not typical tuning forks, but are to be regarded as derived from them by extreme shortening of the clads. It would appear that the canal system is usually or always leucon.

SCOPE OF THE FAMILY

The family here constituted comprises only three genera, namely: *Kebira* Row, *Lelapia* Gray and *Paralelapia* Hozawa.

DJEDDEIDÆ new family

This is a new name proposed for the group designated by Dendy (1893, p. 161) as Heteropiidæ, because *Djeddea* Haeckel (1872) antedates by thirteen years *Heteropia* of Carter.

This is a rather unsatisfactory family and perhaps should be dropped into synonymy either to Amphoriscidæ or to Grantiidæ. The superficial resemblance to the Amphoriscidæ is very great indeed, but as Dendy and Row (1913, p. 750) point out, the large radially placed spicules have a small rhabd in or near the outer surface instead of having an elongate radially placed rhabd. One or two of the clads are also small and near the exterior, but at least one of the clads is enormously developed, elongate and extends downward in the sponge toward the center thereof among the chambers. As in the Amphoriscidæ there are included here genera that vary from typical sycon to almost leucon, in the latter case being of the intermediate sort known as sylleibid.

Scope of the Family

The genera here understood as belonging to the Djeddeidæ include *Amphiute* Hanitsch, *Djeddea* Haeckel, *Grantessa* Lendenfeld, which is a synonym of *Djeddea*, *Grantilla* Row, *Heteropia* Carter, possibly *Hometta* Lendenfeld (a very inadequately known genus), and finally *Vosmæropsis* Dendy which is the one sylleibid genus of the family, the others being typical sycon forms.

ASCONOSA new order

This order is described above in contrast to the Syconosa. To repeat in part, it may be noted that it is established for families in which the leucon architecture appears to have been derived directly from the ascon without any intermediate sycon forms, or else the family (as in the case of the Leucosoleniidæ) is permanently ascon. Furthermore, as far as can be noticed from published evidence, particularly that in Dendy and Row (1913), the position of the nucleus in each of the flagellate cells is basal, far removed from the end at which the flagellum protrudes.

LEUCALTIDÆ Dendy

This family represents the simplest form of the leucon architecture as exemplified in this order; in other words, it is the intermediate between typical leucon and ascon, corresponding to and replacing the sycon as found in the Syconosa. Each sponge of this family has, as it were, a group or colony of ascon sponges; as they grow they anastomose, so that they have only one exit or oscule for a large number of the original persons. Several such clusters may be grouped so that there is a sponge with numerous oscules. Furthermore, about the entire colony of this sort, there grows a cortex or enveloping structure. Although so easily thus compared to ascon, it will be noted that technically the result is a leucon sponge, and yet were the symmetry only a little more regular and simple the type would certainly be called sycon.

Scope of the Family

It is here proposed to divide this family into two subfamilies of which the principal, the Leucaltinæ, comprises not only *Leucaltis* Haeckel, but probably also *Amphorula*, which Haeckel (1872, p. 398) proposed as a subgenus of *Leucaltis*, and which Dendy and Row (1913, p. 787) raised to generic rank, with the assumption, not explained nor understood, that it is a synonym of *Leucandra* (or *Leuconia*). Another generic name which needs consideration here is *Heteropegma* Poléjaeff, which is a synonym of *Leucaltis*. *Leucaltis* is represented from Bermuda by *Leucaltis clathria* Haeckel (1872, p. 159) because Dendy and Row (1913, p. 790) state that the Bermudan sponge which Poléjaeff (1884, p. 45) described as *Heteropegma nodusgordii* new species is conspecific with the earlier *clathria*.

LEUCETTUSINÆ new subfamily

The subfamily is here erected exclusively for the one very peculiar genus, *Leucettusa* Dendy and Row, which is quite possibly, but not certainly, related to *Leucaltis*. From *Leucaltis* it differs strikingly in the direction of being more of the sort to be termed sycon in that it has the symmetrical sycon-like shape, individualized, with one large elongate axially placed cloaca. On the other hand, although some of the flagellate chambers (particularly in the outer portion of the sponge) are elongated and semi-ascon like, it should be noted that, as in typical leucon sponges and *Leucaltis*, many of the other flagellate chambers (particularly those near the cloaca) are nearly spherical in shape and so scattered among the substance of the sponge that they are to be regarded as practically typical leucon.

Scope of the Subfamily

Dendy and Row (1913, p. 739) cite as the genotype of *Leucettusa* the species originally described as *Leucetta corticata* by Haeckel (1872, p. 129). Vosmaer (1886, p. 374) cites *Leucettusa corticata* as being "typical of *Leucetta* Haeckel." Were this a valid genotype designation, then the genus here described as *Leucettusa* would need to be called *Leucetta*, and some other generic designation would need to be adopted for that genus elsewhere referred to in this article as *Leucetta*. This confusion would be forestalled were it true as assumed by Dendy and Row (1913, p. 732) that Haeckel had given as the genotype of *Leucetta* his species *primigenia*, but I can not find where he did so. On the other hand, in the International Rules of Zoological Nomenclature on page 84 it is stated plainly, "Mention of a species as illustration or example of a genus does not constitute a selection of a type," so Vosmaer's reference is probably not to be taken as establishing the type. A disquieting possibility exists that somewhere in the numerous works on calcareous sponges there may exist the designation of *corticata* as a type of *Leucetta*. I have not found such but am led to anticipate the faint possibility of its existence, because of the wording employed by Vosmaer in the above-mentioned 1886 reference. Should this prove to be the case, it is probably in order to refer to the sponges ordinarily called *Leucetta* instead as being *Sycothamnus* Haeckel (1872, p. 118). In this case the name *Leucetta* would apply to that group of sponges ordinarily and above referred to as *Leucettusa*.

DENDYIDÆ new family

This family is here proposed for the one genus *Dendya*, which is to the Leucaltidæ as the Scyphidæ are to the Grantiidæ. In other words, these species of the genus *Dendya* are very like those in the genus *Leucaltis* and other related genera except that they lack the cortex. It will be noted that they are therefore quite commonly regarded as being ascon sponges, whereas *Leucaltis* is regarded as being leucon. This bears out the remarks made above that *Leucaltis* is a transitory or transition type, although nearer the leucons, whereas *Dendya*, also a transitional type, is nearer the ascon.

LEUCETTIDÆ new family

This is a new name proposed for the group referred to as Leucascidæ by Dendy (1893, p. 161), inasmuch as *Leucetta* of Haeckel (1872) antedates by twenty years *Leucascus* of Dendy. This family probably represents the extreme of leucon development in the calcareous sponges. As in the Demospongiæ, there is a relatively small amount of oscular area in proportion to the total mass of sponge, and the nearly spherical flagellate chambers are widely dispersed throughout the ground substance with comparatively long inhalent and exhalent canals. In fact, there are species of *Leucetta*, such as for instance *losangelensis* de Laubenfels (1930, p. 25), which can scarcely be distinguished from species of the class Demospongiæ, except for the chemical nature of their spicules. This family is represented in the West Indian region by two or more species as will be noted below.

Scope of the Family

The genera here understood as belonging to the family Leucettidæ include the following: *Ascoleucetta* Dendy and Frederick; *Leucascus* Dendy; *Leucetta* Haeckel, of which the genotype, if not really established by any of the previous references to it, should be understood as being *Leucetta primigenia* Haeckel, *Leucomalthe* Haeckel, *Pericharax* Poléjaeff, *Sycothamnus* Haeckel .

The West Indian sponge described by Duchassaing and Michelotti in 1864 (p. 111) as *Medon imberbis* is properly a member of the genus *Pericharax* and should be transferred to it. There is a West Indian species which Haeckel (1872, p. 119) regarded as *Leucetta primigenia* variety *microraphia*, but which Dendy and Row (1913, p. 734) raised to full specific rank; it would appear that the sponge described as *Leuconia dura* by Poléjaeff (1884, p. 65) is a synonym of this species.

Other generic names which need consideration here, all of which are synonyms of *Leucetta*, are *Cœnostomus* Haeckel, *Dyssycus* Haeckel, *Leucometra* Haeckel, *Lipostomella* Haeckel and *Teichonella* Carter.

PETROSTOMIDÆ new family

This family is here proposed for two families established by Dendy and Row in 1913, their Minchinellidæ of page 739 and their Murrayonidæ of page 741. *Petrostoma* Döderlein (1892) antedates both *Murrayona* Kirkpatrick (1910) and *Minchinella* Kirkpatrick (1908). The fourth recent genus belonging here is *Plectronina* Hinde. There are also very numerous fossil genera which should be included in this family.

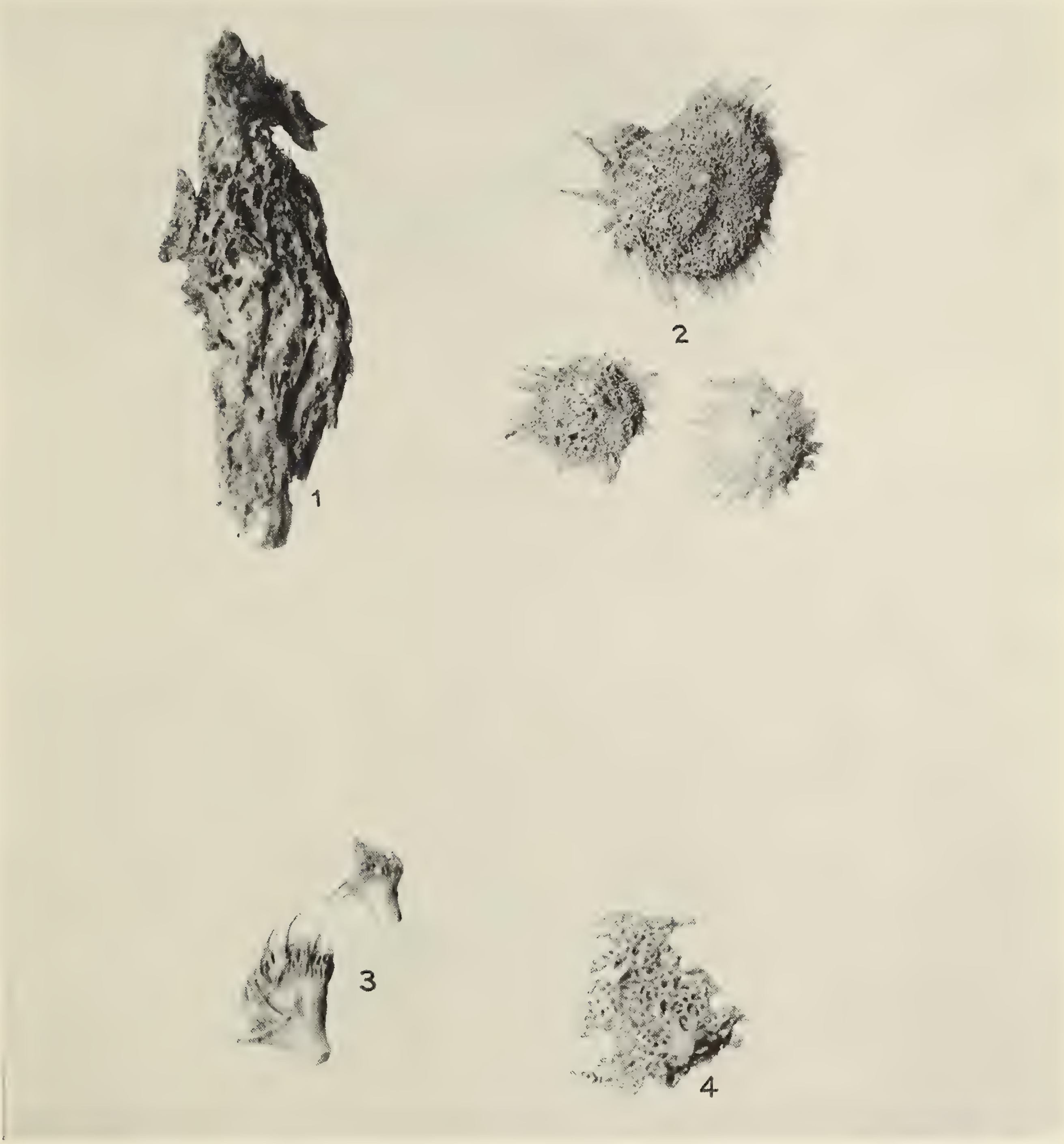
These sponges are typical pharetrone sponges, that is to say, they possess alate sagittal triradiates in which the two clads are closely pressed together, approximating the form of a tuning fork. Furthermore, many of the principal spicules are cemented together to make a rigid or dictyonine type of framework. This has gone so far in the case of *Murrayona* that the original spicules can not be made out at all, although there occur tuning fork spicules which do remain distinct. The rest of the skeleton is merely a continuous reticulation of homogeneous trabeculæ.

LEUCOSOLENIIDÆ Minchin

This family is probably to be regarded as the simplest of all the families of sponges. While it is true that the Oscarellidæ do not have any skeleton, and in that respect are not as complicated as the Leucosoleniidæ which do have monaxons, triaxon and tetraxon spicules, on the other hand the Oscarellidæ do have the very complicated architecture known as leucon, whereas in the Leucosoleniidæ the architecture is merely ascon. The flagellate cells are disposed about only one concavity, which is usually elongate, the walls thereof being held together by inanimate skeletal material such as colloidal jelly and spicules, and among the inanimate substances are living amœboid cells are dispersed.

LEUCOSOLENIA Bowerbank

This genus, which is the typical member of the family, may be differentiated from the others therein as follows: from *Ascute* Dendy and Row it differs in that



Sponges, approximately life size, photographed after preservation in alcohol. Figure 1, *Desmacella pumilio.* Figure 2, *Radiella sol,* three specimens. Figure 3, *Euchelipluma congeri,* two specimens. Figure 4, *Leucosolenia canariensis.*

it does not have any colossal longitudinal oxeas; from *Ascyssa* Haeckel it differs in that it does possess a variety of spicules, whereas *Ascyssa* has only oxeas. This genus is represented from the West Indian region at least by the species described below.

There are very numerous generic names for consideration in this regard, all of which must be regarded as being synonyms of *Leucosolenia*. They comprise: *Ascaltis* Haeckel, *Ascandra* Haeckel, *Ascetta* Haeckel, *Ascilla* Haeckel, *Ascometra* Haeckel, *Ascortis* Haeckel, *Asculmis* Haeckel, *Ascuris* Haeckel, *Auloplegma* Haeckel, *Aulorrhiza* Haeckel, *Clathrina* Gray, *Clistolynthus* Haeckel [Dendy and Row (1913) spelled this *Clystolynthus*, erroneosuly], *Guancha* Miklucho Maclay, *Homandra* Lendenfeld, *Leucopsis* Lendenfeld, *Nardoa* Schmidt, *Nardoma* Haeckel, *Nardopsis* Haeckel, *Nardorus* Haeckel,*Olynthella* Haeckel, *Olynthium* Haeckel, *Olynthus* Haeckel, *Prosycum* Haeckel, *Solenidium* Haeckel, *Soleniscus* Haeckel, *Solenula* Haeckel, *Sycorrhiza* Haeckel, *Tarroma* Haeckel, *Tarropsis* Haeckel, *Tarrus* Haeckel and *Thecometra* Haeckel.

Leucosolenia canariensis (Miklucho Maclay) Dendy and Row

Plate 22, fig. 4.

This species was found growing on the walls of the moat of Fort Jefferson on June 28, 1932.

The largest patch, when found, covered between 2 and 3 sq. cm. of area, and was a little over 1 mm. thick at its greatest extent, but sent up a few tubular projections about 3 mm. above the mass. Several smaller patches were observed and doubtless others were overlooked. The color in life was a bright lemon yellow. In alcohol it is nearly white. The consistency is softly fragile. The sponge consists of ascon tubes with walls 30μ to 40μ thick, the total tube diameter usually about 200μ. It is at least as small in some places as only 150μ and in others reaches a maximum of 300μ diameter. These tubes branch and anastomose very frequently, making a clathrous structure with meshes having a width of opening of some 300 to 400μ. From this reticulation, some of the tubes rise as mentioned above, to terminate as undoubted oscules. The pores are only some 10μ in diameter. The walls are packed with triaxon spicules tangentially placed, and of a rather constant size, namely with all three rays about 6 by 75μ. The angles are also approximately equal. A fair proportion, say perhaps a third, have a fourth ray and are therefore to be regarded as tetraxon. In these cases the fourth ray often projects into the lumen of the tube and they may therefore be said to be hypogastral. In a few cases the fourth ray instead projects from the outer surface. A very few much smaller spicules which were observed may be those that were incompletely formed at the time of collection. One, for example, has rays that were only 4 by 25μ.

This species was originally described as *Nardoa canariensis* Miklucho-Maclay (1868, p. 230), from the Canary Islands.

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INDEX

In preparing the index, names have been omitted which occur in the literature, but which are obviously incorrect spellings of generic names already listed here. Examples are *Tribrachium* for *Tribrachion,* and *Raphiophora* for *Rhaphiophora.*

The following names are unrecognizable as to class, but are probably for sponges: *Achilleum* Oken, *Agilardiella* Marshall, *Auliscia* Schmidt, *Callites* Schmidt, *Cavolina* Nardo, *Cœnostoma* Haeckel, *Desmacodes* Schmidt, *Euthymus* Gray, *Grapelia* Gray, *Guettardia* Nardo, *Hardwickia* Topsent, *Heterophymia* Pomel, *Litamena* Nardo, *Lithospongia* Duchassaing and Michelotti, *Manon* Oken, *Niphates* Duchassaing and Michelotti, *Parafieldingia* (Milne Edwards?), *Tethya* Oken, (later than *T.* Lamarck), *Tragos* Schweigger.

The following names are sometimes regarded as being for sponges, but may really be for specimens belonging in other phyla: *Arabescula* Carter, *Atysite* Toulouzan and Negril, *Aulorhipis* Ehlers, *Botryllus* Oken, *Distomus* Oken, *Epipetrum* Oken, *Evenor* Duchassaing and Michelotti, *Fungia* (Author?), *Halyphysema* Bowerbank, *Kallyspongia* Wright, *Marsipella* Norman, *Moebiusispongia* Duncan, *Schweigger* Nardo, *Solanderia* Duchassaing and Michelotti, *Technitella* Norman, *Velaria* Nardo.

Special mention needs to be made of *Alcyonium* Linné, of which the genotype is Cœlenterate, so that the genus belongs to that phylum. Very numerous sponges were first described by authors contemporary with Linné and Lamarck as being in *Alcyonium.*

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